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FLIGHT
The AIRCRAFT ENGINEER & AIRSHIPS

First Aeronautical Weekly in the World. Founded January, 1909

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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DIARY OF CURRENT AND FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list—

1929.
July 13 .... R.A.F. Display at Hendon.
July 16-27.... 7th International Aero Exhibition, Olympia.
July 19 .... Civil Aviation Ball, at Grosvenor House, Park Lane
July 20 .... Air Garden Party at Heston Air Park, Hounslow
July 25 .... Blériot Cross-Channel Flight Anniversary Fete, Calais.
July 28 .... International Flying Meeting, Sweden.
Aug. 1-14.... French Light Plane Meeting, Orly.
Aug. 15 .... International Balloon Race, Poland.
Sept. 6-7 .... Schneider Trophy Race, Solent.
Sept. 10-20 Aero Club de France Meeting, Le Baule.
Oct. 1 .... Gordon-Bennett Balloon Race, St. Louis, U.S.A.
Oct. 31 .... Guggenheim Safe-Aircraft Competition Closes.

FOUR-PAGE SUPPLEMENT.

With this issue of "FLIGHT" is presented a 4-page inset showing a modern passenger-carrying, dual-control, 3-engined monoplane in part section, giving details of all main parts, controls, etc.

EDITORIAL COMMENT

ON Tuesday of next week the doors of Olympia will open, after an interval of ten years, on yet another International Aero Exhibition. While a gap of ten years is actually much too long, it does have the advantage of making the progress made in that period all the more noticeable. And progress there has certainly been since FLIGHT published its last Olympia Show Issue in 1920. At that time we had not begun to get over the effects of the war, and were still very much feeling our way towards suitable types of civil aircraft. In fact, the designer of 1920 was groping in the dark. He had no precedent to follow, he was attempting to create, he was still strongly under the influence of wartime experience, and finally, and most important of all, he was without the really wonderful aero engines which the designer of 1929 has available.

Olympia

In the choice of material the designer of 1929 is also much better off. In place of ash and spruce and plywood he can, if he so desires, use a variety of high-grade steels, rustless or otherwise. He can join these steels together (or at least some of them) by the simple process of welding, or he can use a variety of mechanical joints. Aluminium alloys have improved in their characteristics, and the problem of corrosion has been, if not solved, then at least minimised.

On the aerodynamic side also we are much better off than we were ten years ago, not so much because of any startlingly new discovery, but rather on account of a better and clearer realisation of the fundamental principles involved. The Lanchester Prandtl aerofoil theory, often referred to as the "modern" aerofoil theory, although Mr. Lanchester

realised it several years before the war, if it has not enabled us to revolutionise our ideas, has at least shown us the natural limitations to progress in aeroplane wing efficiency. The time when many had a sort of secret hope that if they could only hit upon some very special form of wing section, an aircraft of far greater efficiency than any hitherto dreamed of, has definitely passed with the understanding of the causes of and differences between induced drag and profile drag. While this realisation has been something of a blow to a certain class of inventor, it has, on the other hand, provided a fairly well-defined limit to what we may reasonably expect to achieve in the direction of increased wing efficiency.

If one were asked what is likely to be the outstanding feature of the 1929 Olympia Aero Show, the answer will not be in doubt for a single moment. It will be: "all-metal construction." At the moment it is not entirely certain what will be exhibited by foreign aircraft firms, but from advance information which we have received there does not appear to be any doubt whatever that the forms of all-metal construction developed by British aircraft firms during the last few years reach a very much higher average level than the average in foreign countries. We do not say that there are no instances of isolated foreign constructors attaining a quality as high as that of the best British, but we do claim that the general quality of British all-metal design and British workmanship (as distinct from "spit and polish" finish) is well above the average of other nations. For that we have to thank the British Air Council, first for the decision, reached some years ago, that at the lapse of a certain period no more wooden aircraft would be accepted. And, secondly, for leaving each individual constructor free to evolve his own methods and to choose his own material, *i.e.*, steel or duralumin as regards the two chief structural materials. The result has been that we have now in Great Britain almost as many distinct forms of metal construction as there are aircraft construction firms. While this is not, perhaps, a desirable ultimate state, it does have the great advantage that for the present it enables very searching and detailed comparisons to be made, both in the matter of strength for weight and also as regards durability, freedom from corrosion, facility of production in small and large quantities, and possibility of repairs in the field (where service aircraft are concerned).

As was to be expected, Olympia will be largely military in character. Since but a very small percentage of British aircraft firms has produced civilian types of aircraft this was inevitable. And some extraordinarily fine examples of modern British service aircraft will be on view. Unfortunately, many of them will only be "on view" in that they are still on the Air Ministry's Part Publication List, and internal inspection and the publication of performance figures will not be permitted. That, however, is probably inevitable. In other cases machines will be open to the most thorough inspection, and we are very glad that several firms have decided to exhibit their machines either completely in skeleton or, better still, stripped on one side and covered on the other. By doing this, visitors to Olympia will have a unique opportunity to examine down to the minutest detail some of the forms of metal construction now employed in Great Britain. That this will appeal greatly to foreign technical visitors cannot be doubted, and we hold very strongly the view that the great majority of such visitors will return to their own countries with a very high opinion of the quality of British aircraft.

On the commercial aircraft side Olympia will be just a little disappointing. The number of large passenger carriers will be very small indeed, and will be mainly confined to three quite new types—the four-engined Handley Page 40-seater landplane, the hull of the Blackburn "Nile" passenger flying-boat, and the Avro 10.

Of smaller civil aircraft types there will, however, be quite a number, while the light 'plane class and very light 'plane class, as well as the not-so-light 'plane class, will be well represented. A very welcome addition to the "family" of British civil aircraft is an entirely new and highly interesting four-seater twin-engined flying-boat, the Saunders "Cutty Sark." This is a class of machine for which we foresee a very bright future, and it is therefore with a great deal of satisfaction that we learn, just as we are about to go to press this week, that the "Cutty Sark" has been undergoing trials in a very high and gusty wind, and that the new machine has come through with flying colours, sitting well back in the seas and keeping the spray well away from coupé and propellers.

The amphibian type of aircraft, once in a fair way to become popular, was permitted almost to die out several years ago. It is, therefore, all the more gratifying that at Olympia a most interesting revival of the amphibian, revival as regards general class only but novel in everything else, is to be shown by Short Brothers.

The flying-boat class will be on view in several various types, and two among the class will be veterans with long flights to their credit. These will be one of the "Southampton" flying-boats which made a 27,000 miles' flight to the Far East, and the "Singapore" on which Sir Alan Cobham flew to the Cape and back.

Altogether the 1929 Olympia Aero Show will be one of quite exceptional interest, and no one interested in aviation can afford to miss it.

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At St. James's Palace Levée

By command of the King a Levée was held on July 2 at St. James's Palace by the Prince of Wales on behalf of His Majesty.

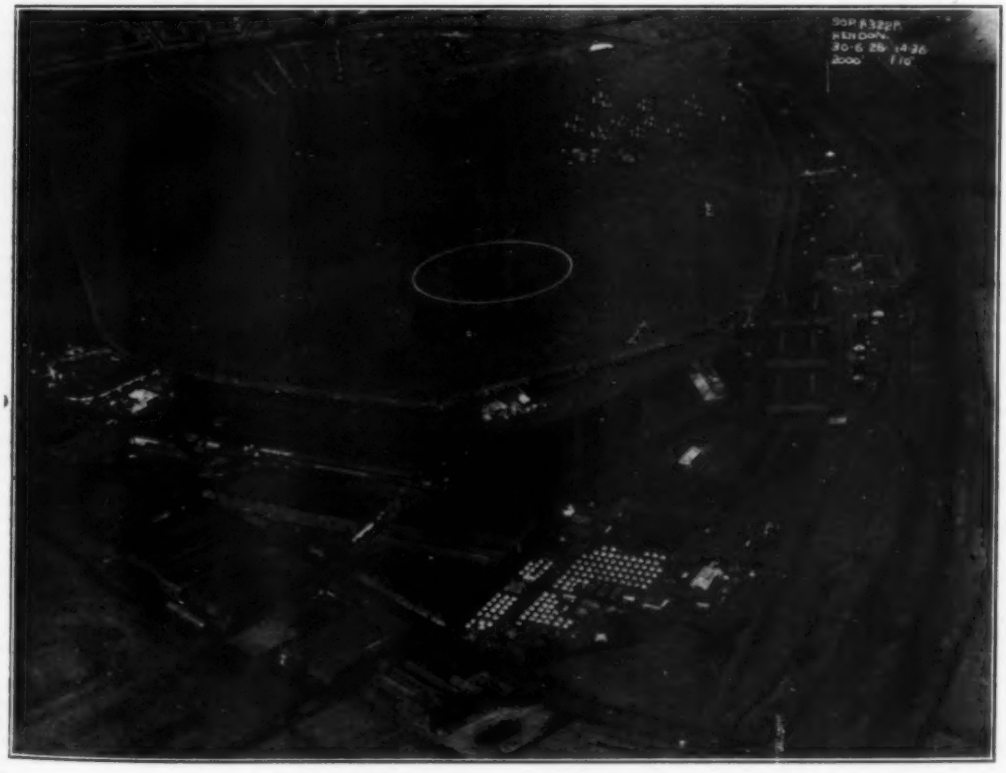
In attendance at the Levée were the Rt. Hon. Lord Thomson, Secretary of State for Air, Sir John Salmond, Principal Air Aide-de-Camp, Air Vice-Marshal Sir Sefton Brancker, Group-Capt. P. F. M. Fellowes, and Group-Capt. W. F. MacNeece Foster. Amongst those presented to His Royal Highness the Prince of Wales, were: Flight-Lieut. D. Blackford, Air Commodore F. Bowhill, C.M.G., D.S.O., Flight-Lieut. T. Brown, Flight-Lieut. N. D'Aeth, Sqdn.-Leader N. Douglas, Sqdn.-Leader A. Durston, Flight-Lieut. A. Ferris, Flight-Lieut. R. George, M.C., Sqdn.-Leader B. Harrison, A.F.C., Wing-Commander R. Knowles, Flight-Lieut. A. MacDonald, Flight-Lieut. A. MacGregor, D.F.C., Wing Commander W. McClaughry, D.S.O., M.C., D.F.C., Flight-Lieut. L. Potter, Flight-Lieut. E. Reid, Sqdn.-Leader J. Sadler, Flight-Lieut. H. Scroggs, Flight-Lieut. E. Searle, Flight-Lieut. F. Skoulding, Sqdn.-Leader J. Slesser, M.C., Sqdn.-Leader M. Thomas, D.F.C., A.F.C., Flight-Lieut. C. Walter, Flight-Lieut. C. Weedon, etc.

The 10th Royal Air Force Display

BY MAJ. F. A. DE V. ROBERTSON, V.D.

THE most interested spectator at the Royal Air Force Display next Saturday will probably be Sir Francis Humphrys, lately British Minister at Kabul. More than anyone else in the vast crowds which are sure to be present he has profited by the extraordinary efficiency and mobility of the Royal Air Force; and quite possibly he and his wife owe their lives to the daring pilots and splendid aeroplanes of the force. Thoughts of the fate of Sir William Macnaghten in 1842 and of Sir Louis Cavagnari in 1879 could hardly fail to come to the mind of Sir Francis last winter, when a friendly Government collapsed, the legation was under fire, and the passes to India were blocked by snow. The army in India was powerless to help him; the R.A.F. in India could only get into touch with, but could not evacuate, the foreigners in Kabul. That made no difference to the result. In a couple of days the R.A.F. in Iraq had come to the rescue. The "Victorias" and a "Hinaidi" soared over the snow-blocked passes, and bore the foreigners away to safety. It is small wonder that Sir Francis is seizing the first opportunity of learning more about the training of the Royal Air Force. To the bulk of spectators the spectacle may seem—what it emphatically is not—a "Pageant." To Sir Francis Humphrys, at least, it will be a "Display" of the results achieved by the normal training work of a year.

In addition to Group Captains T.R.H. The Prince of Wales and The Duke of York (not forgetting that most popular of all Scottish ladies, The Duchess) there will be present several members of the new Cabinet. What Lord Thomson's sentiments will be we have no doubt. The future of the Royal Air Force is safe in his hands. The Prime Minister is a recent convert to the joys of the air. He is a lover of peace, as we all are, but we believe that he wishes to see our island adequately defended; and we have no doubt that the Display



THE DISPLAY FROM THE AIR: Aerial View of Hendon taken during last year's Display. The dark objects behind the enclosures are cars, not people!

will make a deep impression on his mind. To the Chancellor of the Exchequer, it will, we feel sure, be made very manifest that here at least he is getting very good value for a very moderate sum. FLIGHT does not hold that the day has come when the Air Force can supplant all other means of defence ; in fact, it is hoped to demonstrate below that the Army ought to have some more money to spend in a certain direction. Yet there is no doubt that air defence is quite necessary and that it is the cheapest form of defence. Mr. Snowden, we hope, after seeing the Display, will be all the more inclined to lend a sympathetic ear to whatever requests Lord Thomson may have to make to him. The Foreign Secretary too, will have his opportunity. We feel sure that at the Display, and afterwards at Olympia, Mr. Henderson will miss no opportunity of hinting to foreign representatives that if they decide to buy British aircraft they will be buying the best in the world.

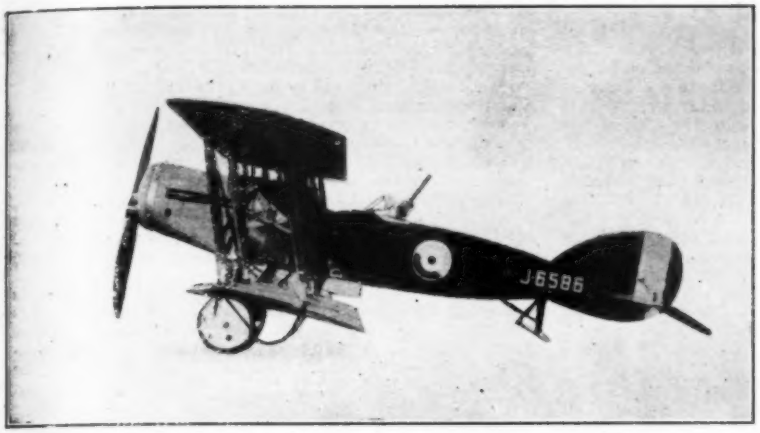
While big business is an outcome of what passes in the minds of the important individuals among the spectators, one should not overlook the probable effect on the mind of Demos. The British public is gradually being educated into air-mindedness. The process is bound to be a slow one, though of late the pace has been speeded up. The Display ought always to be an education. It must be a fine spectacle or the attendance will fall off, but the R.A.F. never finds the least difficulty in providing a show which is absolutely fascinating to watch. But it should never be a circus in the air. It ought always to be demonstrating some point or other of air defence, and if that point is clearly explained, as the excellent programme usually manages to explain it, by slow degrees the lesson will sink into the minds of the voters and tax-payers. We wonder, for example, how many even among the readers of FLIGHT appreciate the reasons for formation flying. Do some of them think it is, like the infantry column of route, a convenient method of moving a squadron from place to place, or do they grasp that each aeroplane is placed so as to give covering fire to some other in the formation ? Do they understand that one Sidestrand can fight two Siskins because the former has a gunner in the rear cockpit defending the tail, while the Siskin is a single-seater and the pilot can only aim his guns by pointing his whole aeroplane at the target ? The present writer remembers a Display some years ago when he overheard Harry explaining to Harriet, as the machine guns of the " Snipes " began to rattle, that the noise was the engines backfiring. We hope that even Harry has now got beyond that stage.

From the educative point of view the Display this year is well devised. Crazy flying is perhaps of rather doubtful utility, but there is no item which is purely meretricious. Squadrons will not attempt to rival the musical rides of the Olympia Tournament. The coloured smoke which will be used by some of the aerobatic aeroplanes will be showy, but will serve a definite purpose by marking out for the spectators the course of each manœuvre. The final " set piece " will not, as in some previous years, be mainly play-acting. It is designed to illustrate the most modern tactical use of aircraft. Of course, to many it will seem but an excuse for a lot of bangs and a big blaze, including the shooting down in flames of a kite balloon. No one would wish to banish the spectacular side of this event, but it is a point to mark that the instruction is there as well as the amusement. It shows broad conception of the uses of the Display that this year the air battle, the kite balloon, and the set piece are not three isolated items on the programme but are combined into one. The plot of the attack upon the port, the fight for mastery of the air, and the ultimate destruction of the enemy's stronghold makes a somewhat long and complex story, and we shall not attempt to forestall the programme by telling that story now. It is enough to remark that the idea is well conceived, and we trust that in its execution the story will be plainly told.

So far as the method of instruction by means of object lesson *plus* short notes in the programme makes it possible, the Display does attempt to show the public that the Royal Air Force at Home has three functions. Perhaps our readers will not consider us impertinent if we remind them what those three functions are. They are :—First and foremost, air defence ; secondly, coastal defence and naval air work ; and, thirdly, co-operation with the Army. They are represented by the three commands, or parts of commands : (1) Air Defences of Great Britain, which includes two Areas and is under a commander-in-chief ; (2) the Coastal Area ; and (3) the army co-operation squadrons which are for the present part of the inland area. It is probably impossible for a Display held only by the Royal Air Force and on an inland aerodrome to do more than it does to make clear this diversity of function. The army co-operation squadrons are given two items in the programme as a rule, namely directing gun fire and picking up messages from the infantry. Neither of them is very spectacular, and last year the artillery observation item did not seem to be understood at all by the crowd. Perhaps it will be better arranged this year. The picking up of messages, if it could be clearly seen by those who have not got binoculars, is a very skilful feat, worthy to rank with any popular " stunt," but it usually proves rather boring to the onlookers. The Coastal Area sometimes gets no show at all in the Display, but this year five " Southampton " boats from Calshot are to fly over Hendon. To a crowd excited by aerobatics and the evolutions of fighter squadrons in formation, the mere passage overhead of five aircraft is not very thrilling. Some spectators may not even realise that the " Southamptons " are boats. Seaplanes, in fact cannot make much show except over water. When one sees them taking off and alighting, one is invariably entranced by one of the most delightful spectacles that aircraft can present. We think it is a great pity that the Coastal Area has not arranged a Display of its own in connection with the Schneider Cup. Sometimes at Hendon fleet-fighters give an exhibition, or take part in the set piece, but to the man in the street they do not look markedly different from ordinary landplanes. In short, these items to be realistic need the presence of units of the Army or Navy, for they belong, not to air defence, but to military or to naval defence.

The majority of the items, and the items most enjoyed by everyone, are those provided by Air Defences of Great Britain. The fact that army co-operation items are interspersed among them probably has a somewhat confusing effect on the mind of the man in the street. He is apt to think in his hazy fashion that everything he is seeing is a sort of military show in the air. The air exercises of the last two summers drove the idea of Air Defence home in a very special way, and the citizen got seriously disturbed and began to write to the papers about it. This was, on the whole, a good thing, although the ideas set forth were as muddled as might have been expected. As the sham fight was waged between fighters and bombers, it was as unreal as a land fight between cavalry and artillery would have been. The citizen of London, in particular, found it impossible to sympathise with the bombers, as he ought logically to have done, and what he thought was the failure of the fighters made him profoundly unhappy. It was almost as bad as losing a test match. Still, a certain amount of useful lesson was learnt by the exercises. This year there is nothing but the Display to teach the citizen any lesson at all.

It would be more than a pity if the public began to forget the very great significance of Air Defence as a separate feature of any future war. It is the tendency to forget that it is the supreme function and duty of the Royal Air Force to provide this sort of defence, which still every now and again leads to demands that the Air Ministry shall be abolished and the air force divided between the Admiralty and the War Office. Many apologists for the new policy have unwittingly contributed to this confusion of thought by insisting too much that the air is one and indivisible, and that everything which goes up into the air must, of necessity, be under one control. Whether it is really necessary for the air squadrons which work with the army and the naval air units to be under the same control as the Air Defence of Great Britain and the R.A.F. in Iraq and Aden, is a point which will probably be discussed as much in the future as it has been in the past. The one essential fact which it is necessary to try to bring home to the public is that Air Defence must be under the Air Ministry, and must be in the charge of the Royal Air Force. The discussion should be pinned down to that. Once that great necessity has been generally grasped, it really becomes a matter of detail, important detail, but still detail, whether or no the Air Ministry is responsible for the air arms of the Army and the Navy. At least, to the R.A.F. it is only a detail ; it may be much more than that to the Navy and the Army. Air defence is a new conception, and the study of it is a new science of war. It requires the full attention of an air staff and an air staff college. The theories which they propound must be worked out in practice by a separate specialist service. The air exercises of the past two years, as we said above, gave the taxpayer some inkling of the problems involved, but he could not get away from the idea that his only defences were the fighter squadrons, the guns, and the searchlights in this country. He could not take it in that the task of those units would have been immensely simplified if the invaders had been bombed in their own aerodromes before they started off for the English Channel. His very natural mistake served the useful purpose of showing the need for practical education on every possible



IN THE DISPLAY:—Although a War Veteran, the Bristol Fighter, modernised and fitted with slots, is still seeing service in the R.A.F.

occasion—and the Display is one such occasion. The problem, of course, is not quite so simple as we have just suggested. If it could be reduced to the simple maxim, "Bomb the enemy's aerodromes before he bombs yours," well, any competent officer from Camberley could deal with it. The constant variations in the methods of applying strategical and tactical principles caused by the constant technical advances made in the design of aircraft, are one complication; and one need not be in the confidence of the Air Staff to assert that there are many more. We dare risk no bungling in dealing with Air Defence. Everything must be of the best, for it may be a matter of national life or death. In the event of war, an air campaign will certainly be fought before either army is mobilized and ready to move, and one side may gain complete, or, more probably, partial success in that campaign. Complete air victory would surely end the war before the armies had moved at all; but that is hardly to be expected. The great war afforded no precedent for expecting a complete air victory. But a partial air victory will have an immense effect in easing difficulties which confront the army once it does begin to move. It would also remove the fear that the enemy, supposing that he attempted to defy all scraps of paper, would be able to bomb the civilian population into surrender. We simply cannot afford to take the slightest risk of defeat in the air campaign, and therefore Air Defence of Great Britain must be cherished as our first line of defence.

We would not depreciate the importance of the Army. Sea power has not won every war, and air power may not, by itself, win any more. We have to bethink ourselves that the Army may have to strike the final decisive blow. It will certainly not be able to do so without the help of an efficient air arm, and we must remember that it is extremely improbable that Air Defence of Great Britain will be able to provide that arm. There are less than half-a-dozen squadrons allocated to army co-operation in this country, and they are equipped with Atlas two-seaters. Their task, a highly-specialized task, is to act as the eyes of the Army. But if enemy fighters got at them, they would speedily be shot down, and the Army would be left blind and helpless. On Army manœuvres, it is customary for the Army to borrow a few squadrons of fighters and bombers from A.D.G.B. That would be impossible in time of war. A.D.G.B. would have its own work to do, and would be unable to spare a single squadron to the Army. If I remember right, Marshal of the Royal Air Force Sir Hugh Trenchard once prophesied that in the first fortnight of war (that is by the time the army was mobilised and ready to move) the air forces of both sides would have lost about 80 per cent. of their strength. If that is approximately correct, there would certainly be no margin to lend to the Army. It is necessary for military defence that the Army should have its own air arm, and that that should be intact when the Army commences to move. It should be as impossible for A.D.G.B. to borrow an army squadron as for the reverse to happen. The Army needs fighters to protect its co-operation aircraft, and bombers to concentrate on the opposing army. It has no such units. We wonder is the Army Council satisfied with that position?

The Army gets a very small vote of public money, and it is comprehensible that it wishes to spend almost every penny of that on the urgent experiments in mechanisation. In the meantime, it is content to accept whatever aircraft the Air Ministry gives it. It is also content that the cost of those squadrons, and of the School of Army Co-operation should be borne by the Air Vote. This arrangement should be regarded as temporary. That school and those squadrons add nothing to Air Defence; they are part of military defence, and they ought to be paid for by the War Office, as the Navy pays for the aircraft which it orders. On the other hand, the Air Ministry should take over the ground units which are part of Air Defence. The air force has its own armoured cars in Iraq and Transjordan; why should it not have its own searchlights and guns in Great Britain? So soon as the Army has come to some decision about mechanisation, it will be time for it to turn its attention seriously to the air, and we shall welcome the time when it is in a position to spend more on that arm, and to relieve the Air Vote of certain items which are essentially military.

IN THE DISPLAY:—The Gloster "Grebe" ("Jaguar"), until recently one of the standard single-seater Fighters in the R.A.F.

SATURDAY'S PROGRAMME AT THE DISPLAY

ALTHOUGH Their Majesties The King and Queen will not be present at the Royal Air Force Display at Hendon on Saturday, July 13, The Prince of Wales and The Duke and Duchess of York have intimated that they will attend.

As usual, the list of other visitors who will witness the Display is again a notable one. Nearly every foreign country is sending a large number of distinguished representatives of their Air Services and aircraft industry—in fact, the foreign attendance will probably be the most prominent gathering of aeronautical authorities from overseas who have ever attended any air function. Several members of the Cabinet have notified their intention of being present, including the Prime Minister, Mr. Philip Snowden, Chancellor of the Exchequer, Mr. Arthur Henderson, Secretary of State for Foreign Affairs, and Lord Thomson, Secretary of State for Air. The Diplomatic Corps will also be strongly represented, amongst those who have accepted invitations being General Dawes, the American Ambassador.

Other distinguished visitors will include Viscount Lewisham, Lord Great Chamberlain, Earl of Reading and Sir Francis Humphrys, until recently British Minister in Afghanistan.

The programme, as Maj. Robertson has pointed out in the preceding article, is thoroughly representative of the Service work of the Royal Air Force, and is, in fact, a public demonstration of some of the many varied duties which the Air Force has to undertake. The flying carried out in connection with the Display forms a valuable adjunct to regular Service training, and no item in the programme is admitted unless it definitely illustrates some phase of the activities of the Royal Air Force.

It not only provides a thrilling flying programme which is designed to hold the sustained interest of spectators, but it enables aeronautical developments in many directions to be studied and progress noted from year to year.

The gates open at 10 a.m. and from then until 3 p.m.—when the main programme opens—various " minor " events will take place, such as Headquarters Air Race ; Reserve Officers' Relay Race ; Artillery Observation ; Balloon Chasing, etc. As for the main programme, many good things are in store for the spectators, and we do not intend to " spoil sport " by describing all that will be seen. We may say, however, that in addition to aerial combats of various kinds, Air Evolutions by three Fighter Squadrons, and the ever-popular Flight Aerobatics by the Central Flying School "Genet-Moths," there will be displays of Individual Aerobatics, Simultaneous Parachute drops, and " Crazy " Flying.

Quite an interesting—and unusual—event will be the participation in the programme of a squadron of Supermarine " Southampton " flying-boats. These aircraft are similar to those used by the Royal Air Force for the Far East flight which concluded a 27,000-miles cruise to India, Australia, Hong Kong and Singapore a year ago. They will leave their base at Calshot, near Southampton and after flying over land part of the way, will give a flying demonstration at Hendon during the afternoon.

Another new feature is the use of coloured smoke to enable spectators to follow closely the various evolutions, such as spinning, looping, rolling, and half-inverted loops, which are being carried out by two pilots of the Aeroplane and Armament Experimental Establishment on " Gloster Grebes." The apparatus to enable this to be done will be similar to that employed in skywriting.

The main event of the afternoon will consist of a great air battle and an attack on a fortified port which is occupied by a troop transport and other shipping. Six squadrons comprising nearly 50 aircraft will take part, including Army Co-operation aircraft, Single Seater Fighters, and Day and Night Bombers. During the battle an observation kite balloon will be shot down in flames, but the observer, Squadron-Leader " Sandbags " will be saved by parachute.

As regards the types of aircraft taking part in the Display, this year there will be no " Fly Past " of " New and Experimental " types—these will be seen at the forthcoming Olympia Aero Show—and only Service machines of to-d will take part. A full page illustration of each of these v be found in the following pages, while two (one, that har War Veteran the " Brisfit " or " Bristol Fighter," which, modernised and equipped with Handley Page Slots, is still in use for certain duties in the R.A.F., the other, the Gloster " Grebe," which for a long time was one of the most popular single seater fighters in the R.A.F. and now replaced by mor modern types), both figuring in the programme, will be found on p. 563.

PER ARDUA AD ASTRA

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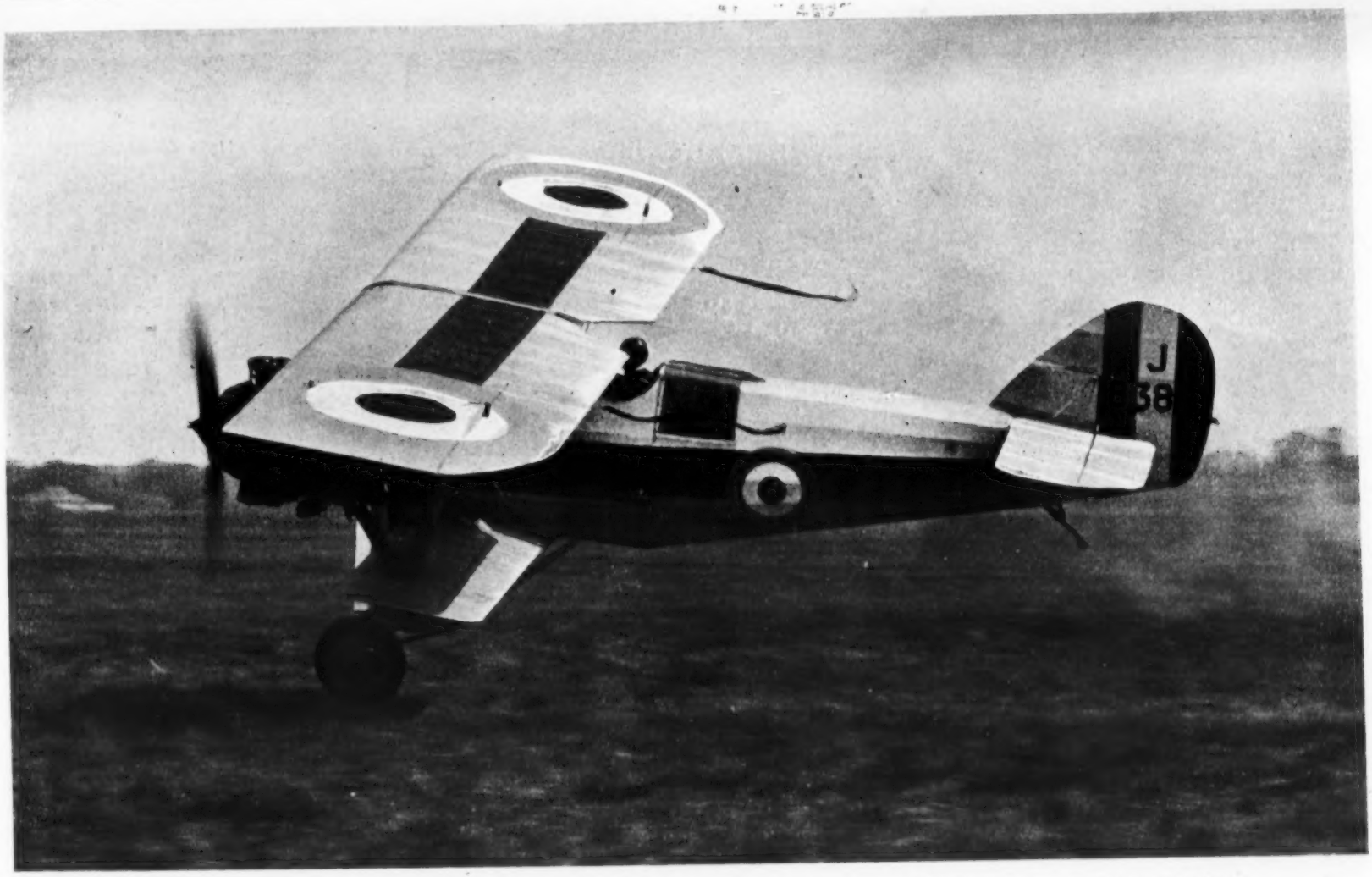
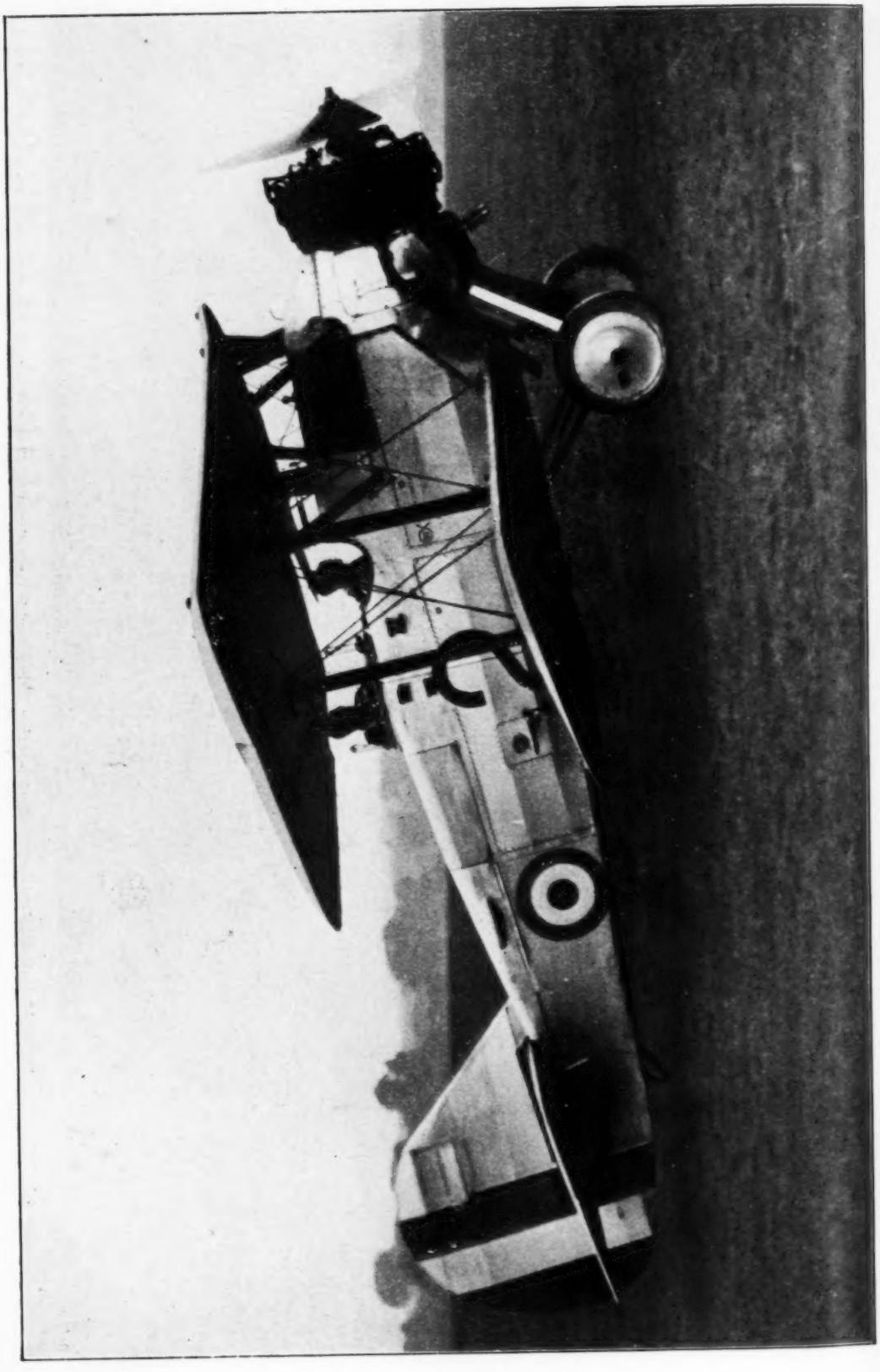
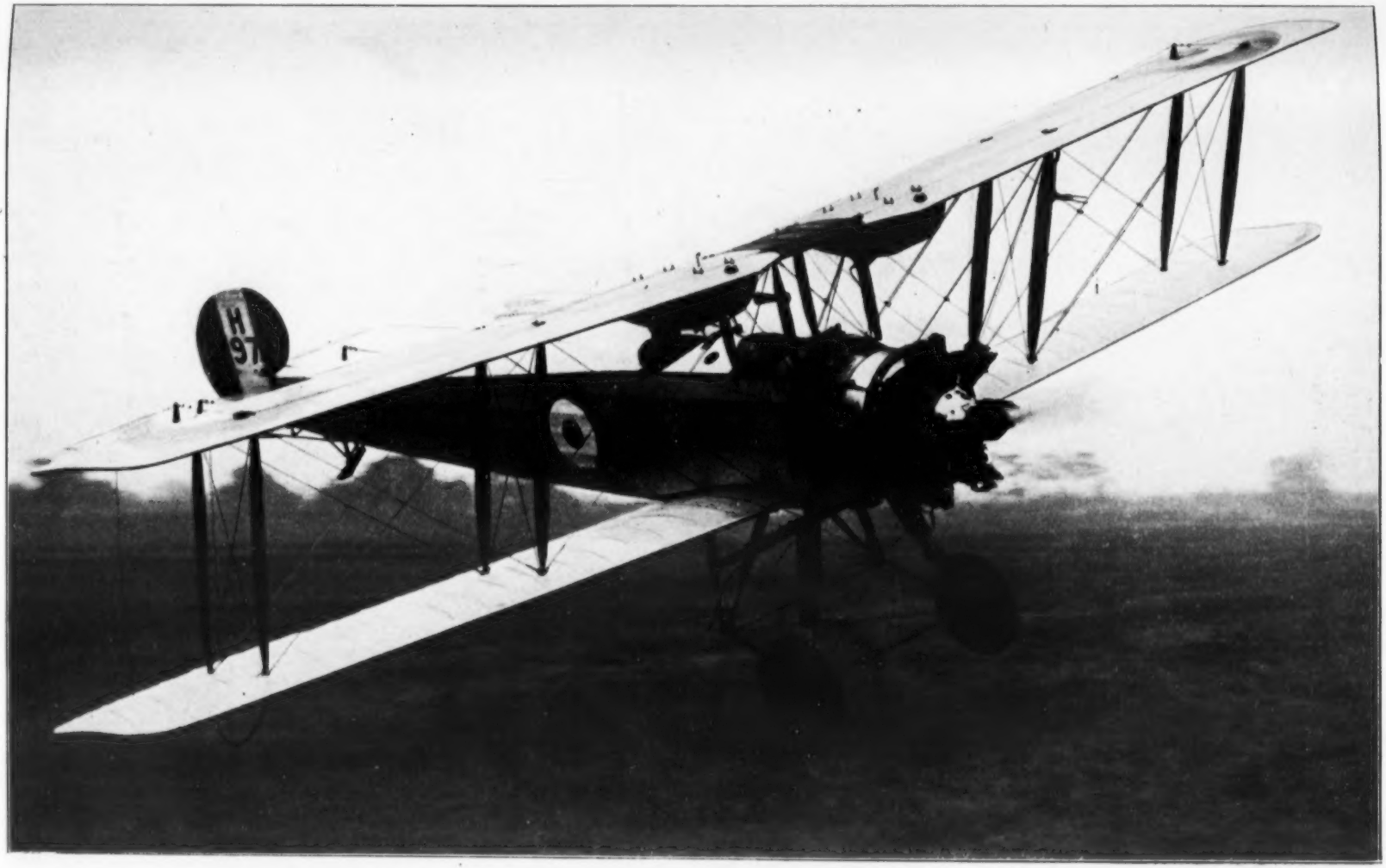


ARMSTRONG WHITWORTH "SISKIN IIIa": Single-seater fighter, with Armstrong Siddeley "Jaguar." ("FLIGHT" *Photo.*)

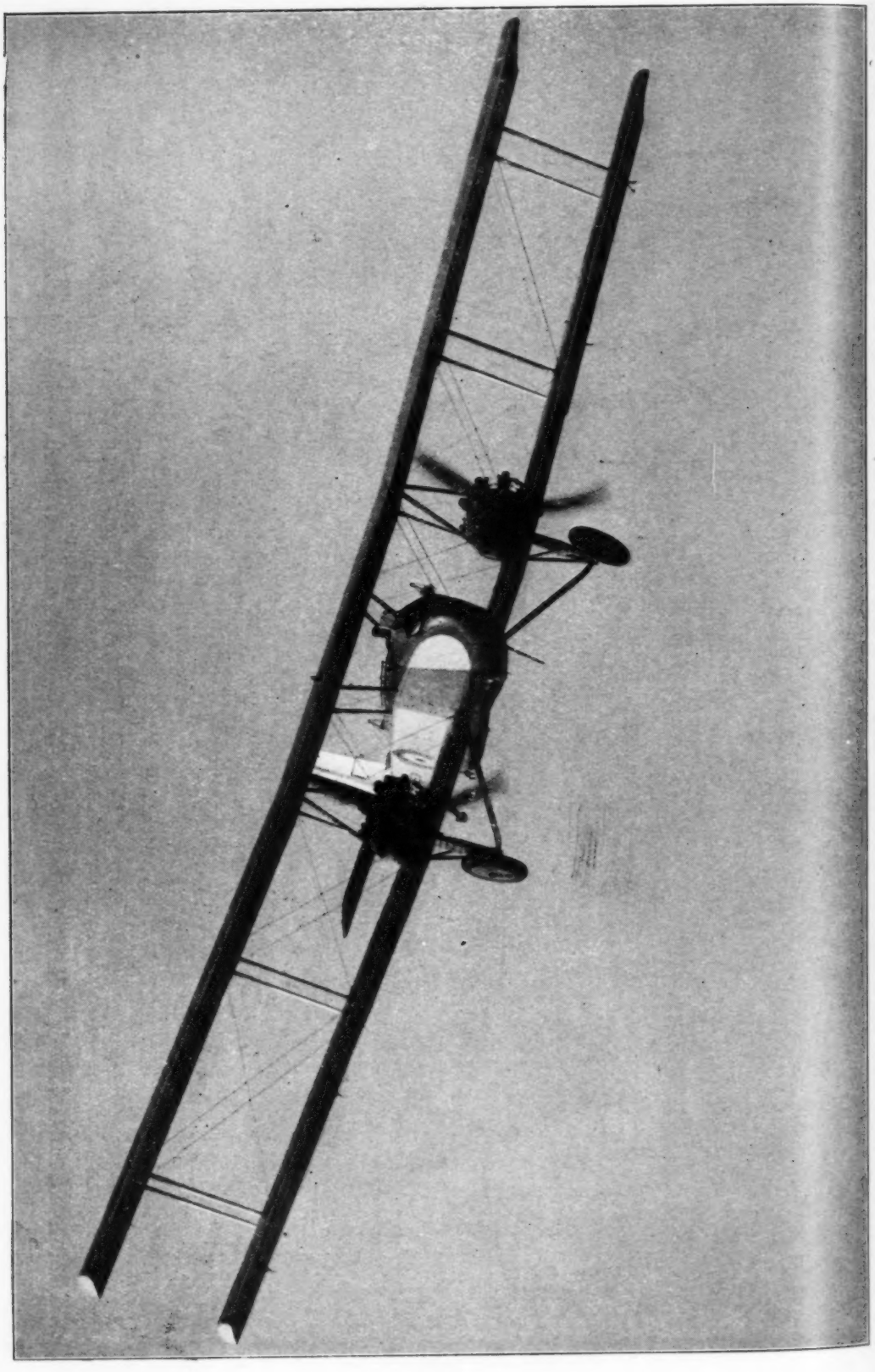


ARMSTRONG-WHITWORTH "ATLAS": Army Co-operation 'plane with Armstrong Siddeley "Jaguar." ("FLIGHT" *Photo.*)

ARMSTRONG-WHITWORTH "ATLAS": Army Co-operation 'plane with Armstrong Siddeley "Lynx." ("FLIGHT" *Photo.*)



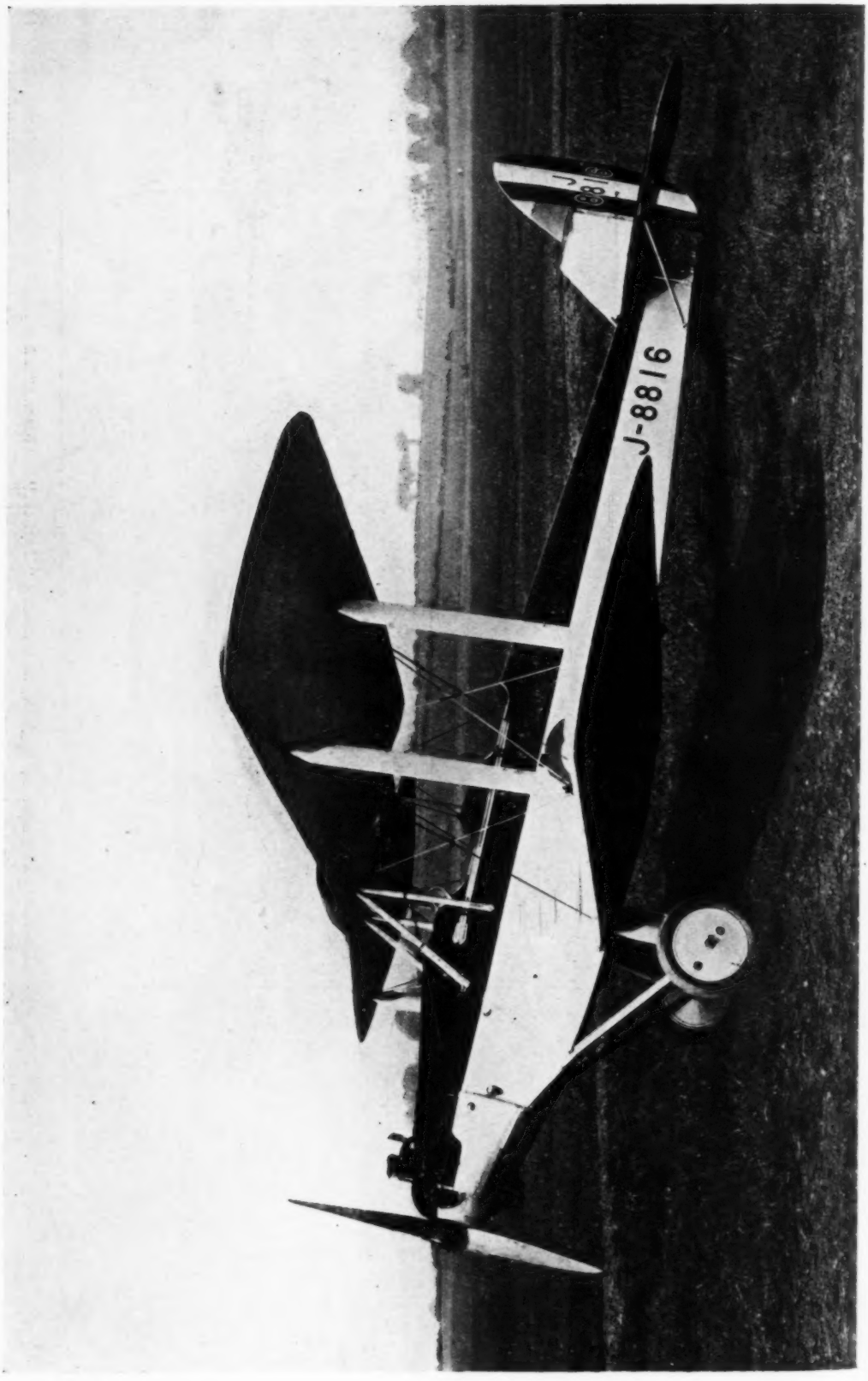
AVRO "504-N": Training machine, with Armstrong Siddeley "Lynx." ("FLIGHT" *Photo.*)



BOULTON AND PAUL "SIDESTRAND": High-performance bomber, with two Bristol "Jupiters." ("FLIGHT" Photo.)

BOULTON AND PAUL "SIDESTRAND": High-performance bomber, with two Bristol "Jupiters." ("FLIGHT" *Photo.*)

BRISTOL "BULLDOG": Single-seater Fighter, with Bristol "Jupiter." ("FLIGHT" *Photo.*)



DE HAVILLAND "MOTH": Light Training 'plane, with Armstrong-Siddeley "Genet." ("FLIGHT" Photo.)

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TROPHY

S MOTH

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as entered in the KING'S CUP AIR RACE. F.C., it was the winner of the £50 prize for the Stack finished 6th in the race (after leading intermediate landing when only 70 miles from

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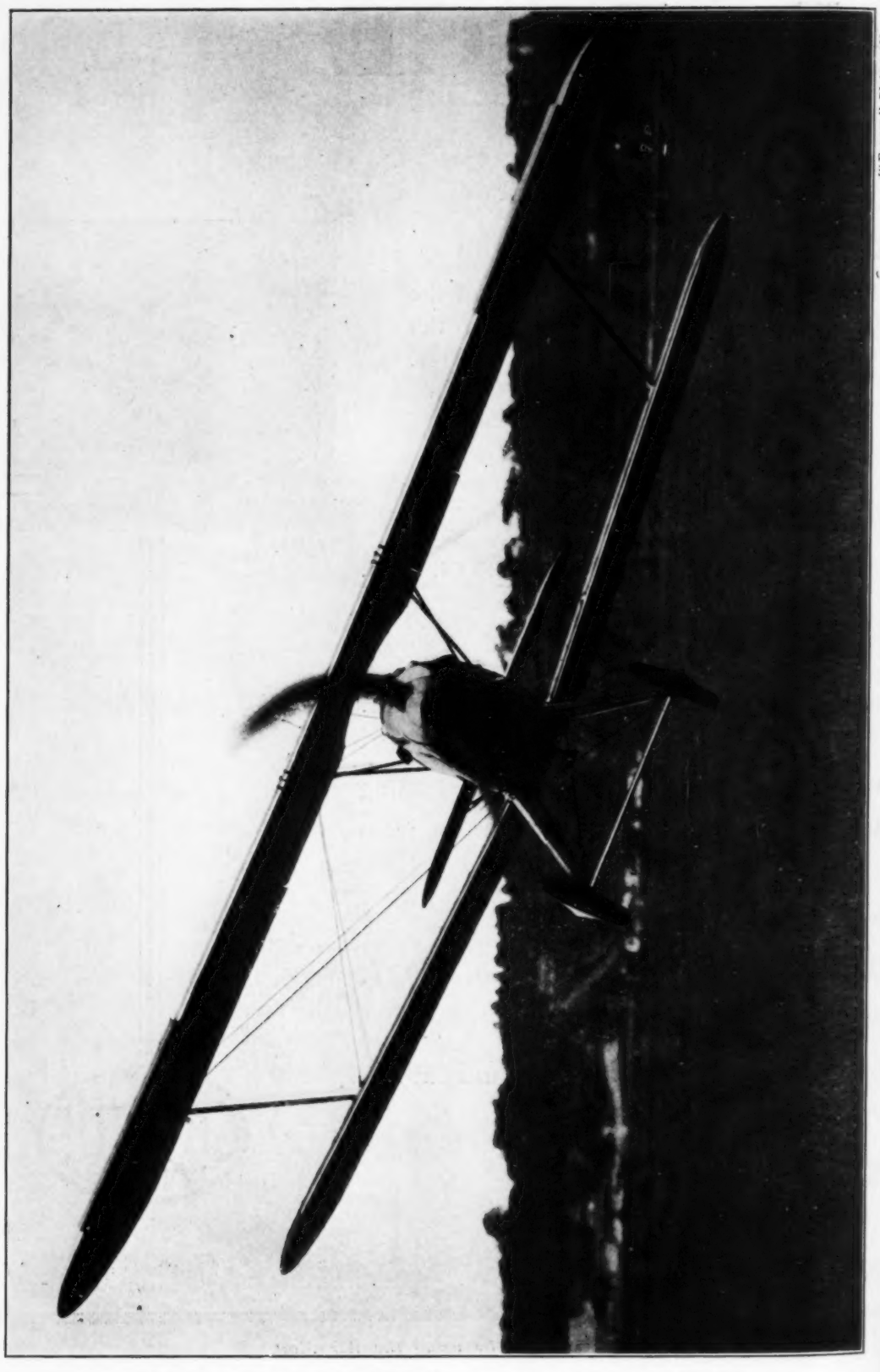
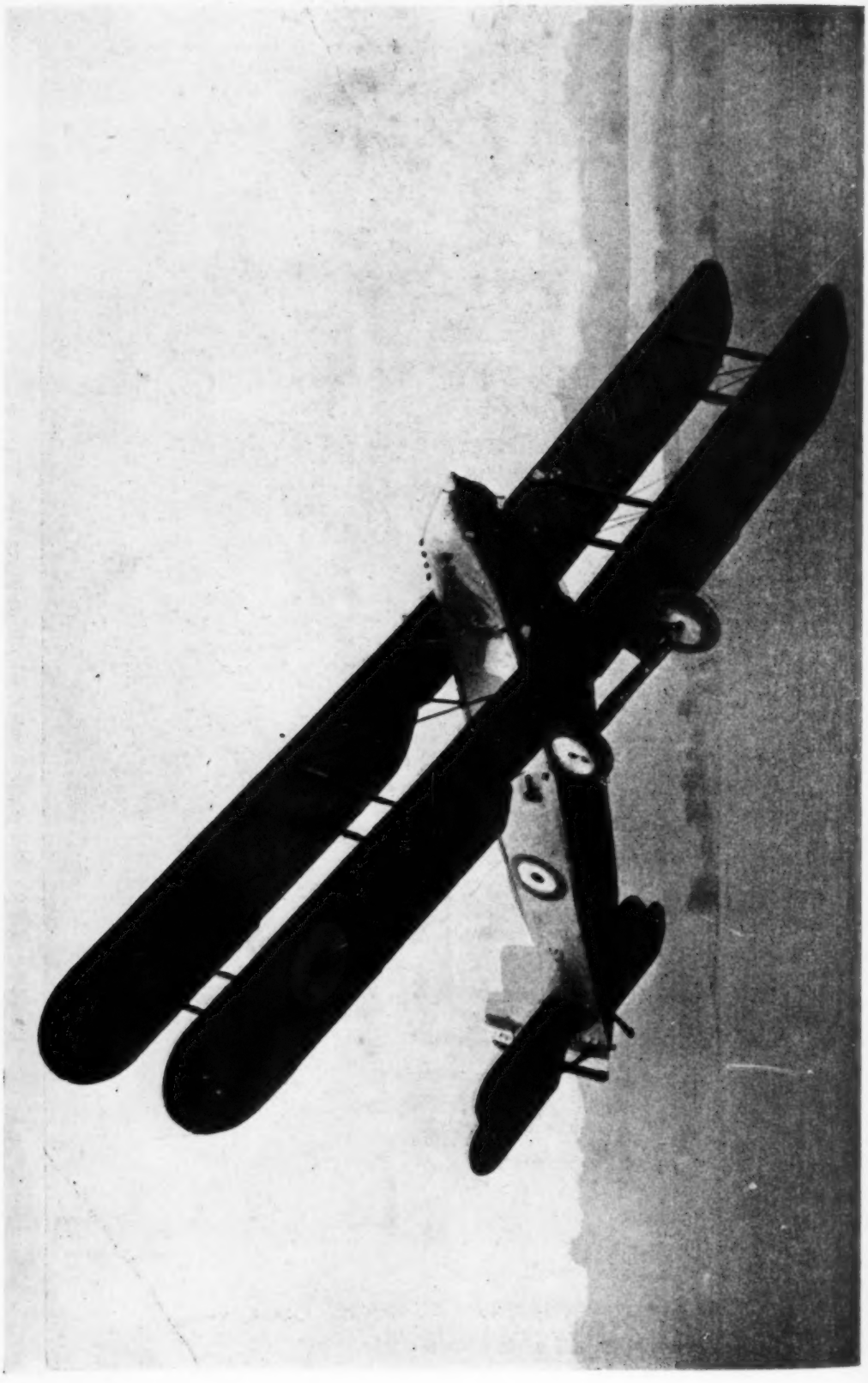


The Latest R.A.F. Day Bomber. The Hawker Hart with Rolls Royce F. Engine. ["FLIGHT" Photograph]

The Latest R.A.F. Day Bomber. The Hawker Hart with Rolls-Royce F. Engine.

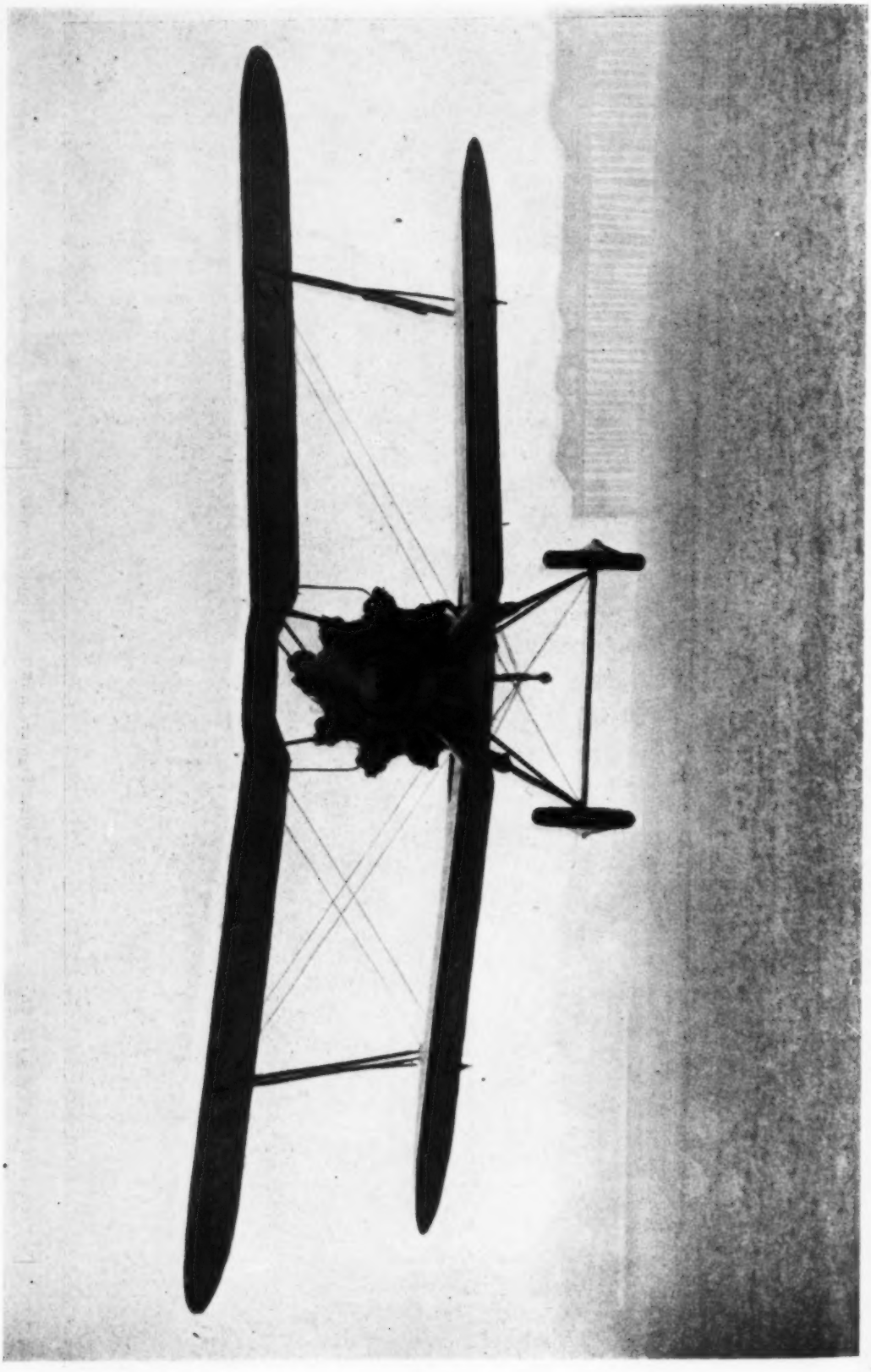
FAIREY "FOX": Two-seater Bomber, with Rolls-Royce F.11. ("FLIGHT" *Photo.*)



FAIREY III F : General-Purpose two-seater, with Napier "Lion." ("FLIGHT" *Photo.*)

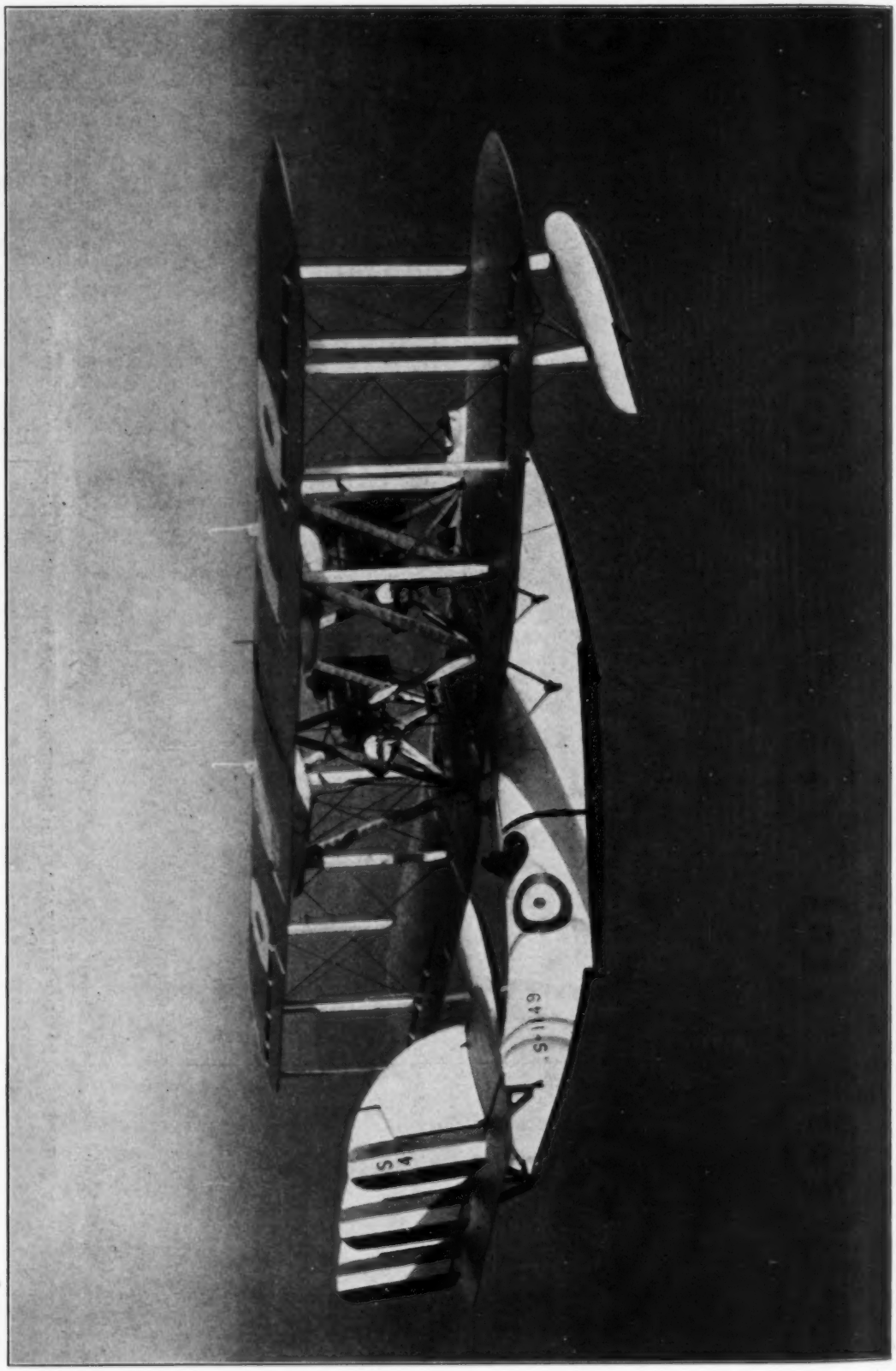
FAIREY III F : General-Purpose two-seater, with Napier "Lion." ("FLIGHT" *Photo.*)

FAIREY "FLYCATCHER" : Single-seater Fleet-Fighter, with Armstrong Siddeley "Jaguar." ("FLIGHT" *Photo.*)



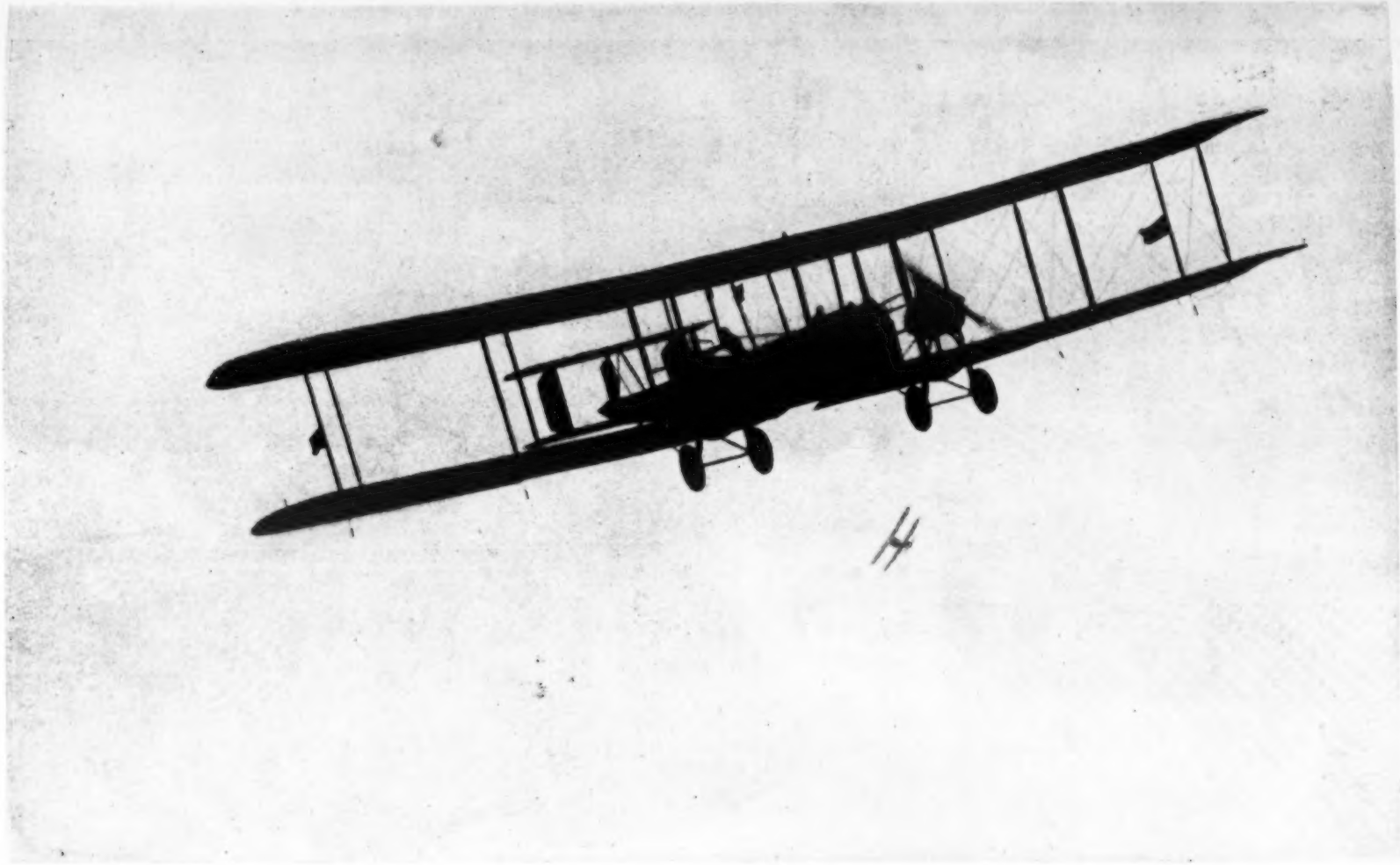
GLOSTER "GAMECOCK": Single-seater Fighter, with Bristol "Jupiter." ("FLIGHT" Photo.)

HANDLEY PAGE "HYDERABAD"; Night Bomber, with two Napier "Lions." ("FLIGHT" *Photo.*)



SUPERMARINE "SOUTHAMPTON" : Reconnaissance Flying-Boat, with two Napier "Lions."

SUPERMARINE "SOUTHAMPTON": Reconnaissance Flying-Boat, with two Napier "Lions."



VICKERS "VIRGINIA": Night Bomber, with two Napier "Lions." ("FLIGHT" *Photo.*)

VICKERS "VIMY": Training Bomber, with two Napier "Lions" (other engines also fitted).

BRITISH AIRCRAFT at OLYMPIA

IN the following pages will be found illustrated descriptions of all the types of British aircraft to be exhibited at Olympia. We have endeavoured to give three-view general arrangement drawings of all the machines, but in a few instances they have not been available. The sketches were obtained by artists on the permanent staff of FLIGHT, and were collected during visits to the various aircraft firms throughout the country, covering a period of many weeks previous to the Olympia Show. It is hoped that those of our readers who are unable to visit Olympia will find the following pages of use and interest, and that from them readers will be able to form a good idea of the machines exhibited, while those who are going to Olympia will find our descriptions a useful guide to the Show.

Below we give an index to the descriptions of the machines exhibited by the various aircraft firms. The first figure after each machine indicates the page number on which the description of the machine starts, while the following figure, in parentheses, indicates the number of the page on which a photograph of the machine will be found.

A.B.C. Motors, Ltd.:
"Robin" 580 (583)
Armstrong Whitworth:
"Argosy" 582 (583)
"Atlas" 585 (583)
"A.W. XIV" 585 (583)
Blackburn:
"Nile" .. .. 586 (—)
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"Lincock" 588 (589)
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Boulton & Paul:
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110 A .. .. 594 (—)
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Index to Exhibitors and Stand Numbers will be found on pp. 649 and 650.

A.B.C. MOTORS, LTD.

HITHERTO chiefly an aero engine firm, with two well-established engines in the 35 h.p. "Scorpion" and the 70-h.p. "Hornet," Mr. Dennis, managing director of A.B.C. Motors, Ltd., decided some months ago to enter the field of aircraft construction so as to utilise to the full the engines already produced by the firm of which he is head. He secured the services of Mr. "Tony" Fletcher as designer, and the little "Robin" to be exhibited on the stand of A.B.C. Motors is the first machine to be produced.

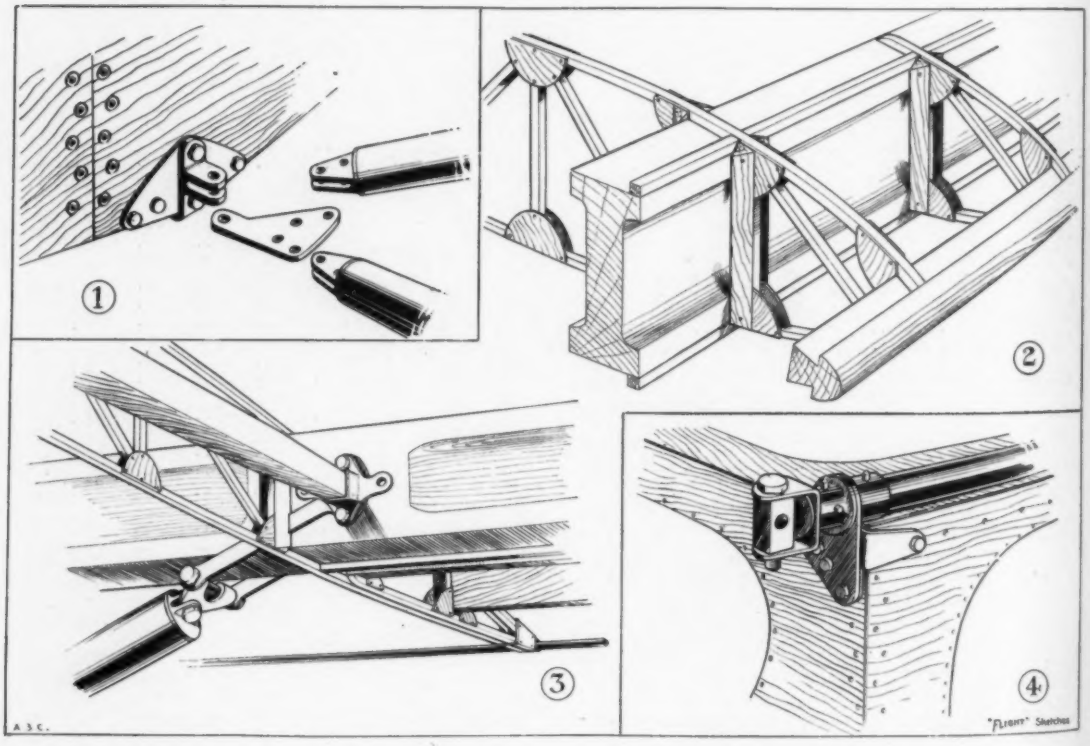
The "Robin" is a single-seater light monoplane of all-wood construction, and is perhaps mainly remarkable on account of its enclosed drive, or *conduite interieure*, being the first light single-seater of this type to be produced in Great Britain. Cabin monoplanes have, of course, been constructed before, but in the "Robin" we have this arrangement incorporated in a very small and compact machine. Opinions will doubtless differ as to the necessity or otherwise of an enclosed cabin in such a small machine, and as this is almost entirely a matter of personal taste there is little need to discuss the question here. The advantage of the enclosed arrangement is that special flying clothes are unnecessary, and it is likely also that the engine noise reaches the ears of the pilot with less distressing effect, although as we have said pilots differ in their views on this subject. It should be recollected, however, that with a cabin machine having sliding windows (as does the "Robin"), the pilot does have the option of opening the windows and thus obtaining very largely the freedom of the open type of machine.

In the "Robin" the cabin is entered through a door on the right-hand side, and although this may not always be needed, there is a hinged skylight in the roof so that with this raised it is rather easier to enter the cabin and get settled in the seat. Once the pilot has arranged everything to his satisfaction, the skylight is closed in such a manner that it cannot open accidentally while the machine is flying. The door on the starboard side, as well as the wall on the opposite side, are provided with windows, so that what with these and the skylight and the large windscreen in front, plenty of light finds its way into the cabin, which is more than one can say of some commercial passenger machines. In front of the windscreen the deck of the fuselage is dropped about a foot, and in addition the deck fairing slopes down towards the engine, thus giving a very good view forward. Aft of the cabin is a luggage compartment large enough to take two suitcases, so that the owner of a "Robin" can take with him (or her) plenty of clothes for a prolonged tour.

The "Robin" fuselage is of the "box" type with light stringers and formers, and plywood covering. The wings also are of wood construction, with spindled I-section spars and light wooden ribs, the whole fabric covered. The two halves of the wing are braced to the lower longerons of the fuselage with a pair of Vee struts on each side, and hinges are provided on the rear spar attachments to enable the wings to be folded. When this is done, the overall width of the machine is reduced to 11 ft. 8 in.

The undercarriage is of the "split" type, each wheel being supported on a tripod formed by the bent axle, the radius rod and the telescopic leg. The shock absorbers are in the form of endless rubber rings slipped over crutches, and enclosed in streamline fairings. The wheel track is wide (5 ft. 0 in.) in proportion to the span of the machine, so that there should be little tendency to "cartwheel"

The engine of the "Robin" is an A.B.C. "Scorpion" two-cylinder, flat twin air-cooled, bolted to a multi-ply engine



ON THE A.B.C. "ROBIN": The lift strut attachment to the fuselage is shown in 1, and details of the wing construction in 2. In 3 is illustrated the attachment of the lift strut to the rear spar, and in 4 the duralumin tube across the top of the fuselage, and which carries the fork and block for the wing spar attachment.

("FLIGHT" *Sketches.*)

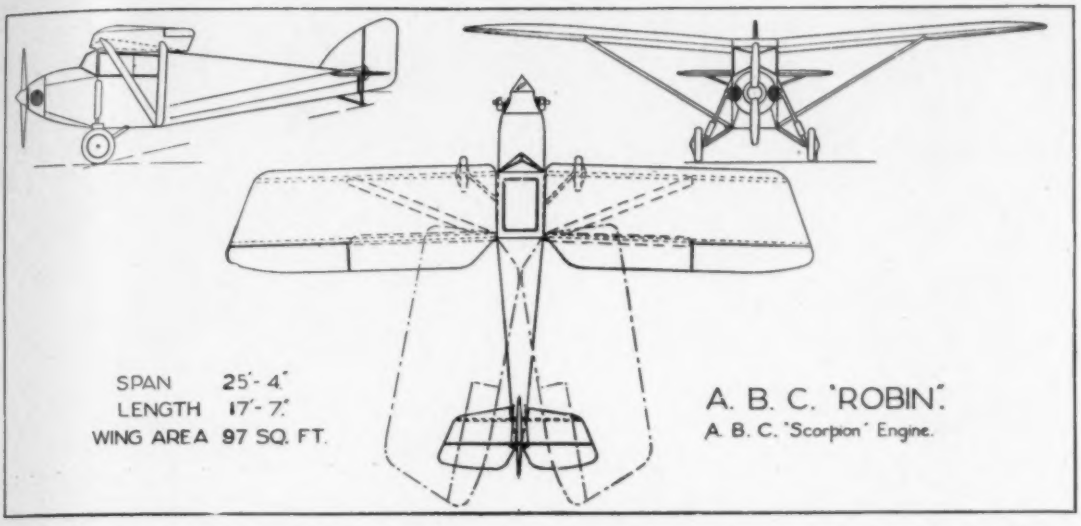


plate in the nose of the machine. The petrol tank is housed in the deck fairing in front of the windscreen, a position which is high enough to give direct gravity feed to the carburettor.

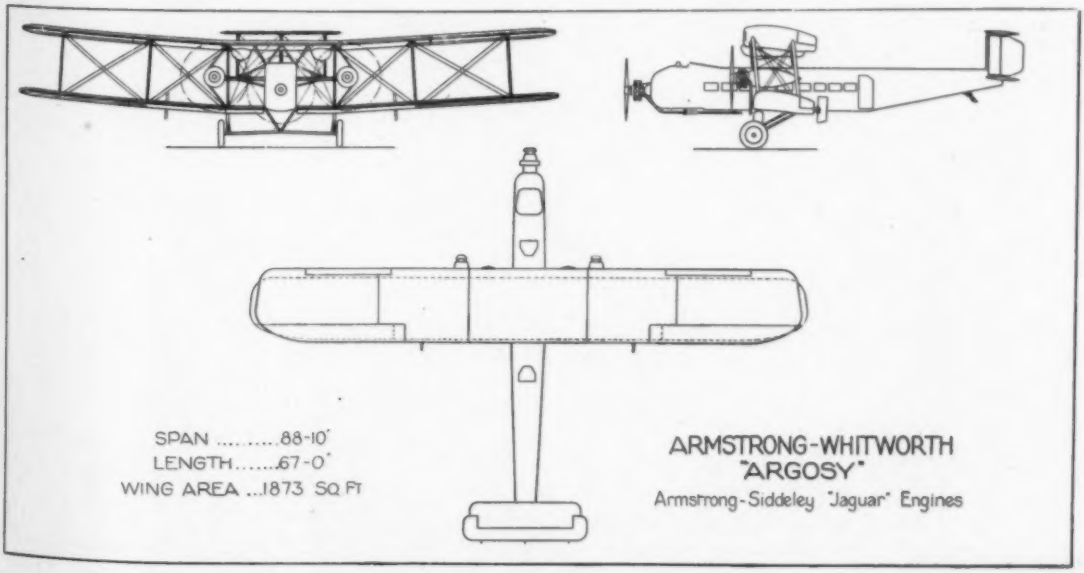
The main dimensions and areas of the "Robin" are: Length, o.a., 17 ft. 7 in; wing span, 25 ft. 4 in.; total folded width, 11 ft. 8 in.; total wing area, 97 sq. ft.; area of ailerons, 13 sq. ft.; area of tail plane, 9 sq. ft.; area of elevators, 6 sq. ft.; area of fin, 2·5 sq. ft.; area of rudder, 4·5 sq. ft.

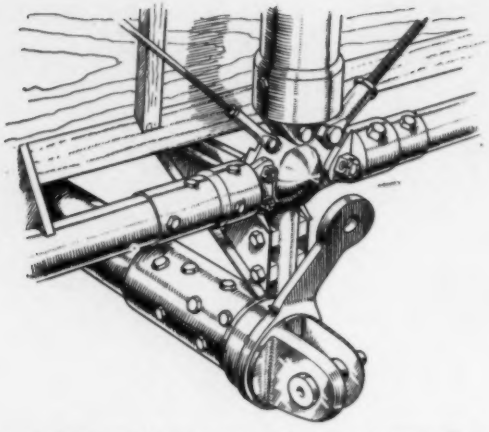
The tare weight of the machine is about 400 lbs., and the certificate of airworthiness covers a gross weight of 680 lbs., which will cover a fairly heavy pilot and a good deal of luggage in addition to fuel for 4 hours at a cruising speed of about 85 m.p.h. At this speed the fuel consumption is remarkably low, and is estimated to correspond to approximately 40 miles per gallon. At the moment of going to press with this week's issue of FLIGHT, actual performance figures are not available, but the estimated top speed of the "Robin" is 105 m.p.h. and the landing speed approximately 40 m.p.h.

SIR W. G. ARMSTRONG WHITWORTH AIRCRAFT, LTD.

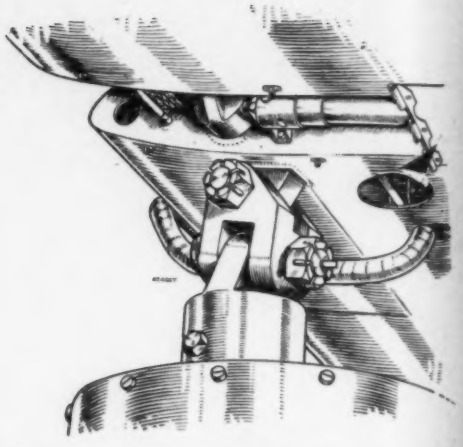
THE exhibits of A. V. Roe and Co., Ltd., will, at Olympia, be staged on the same stand as those of Sir W. G. Armstrong Whitworth Aircraft, Ltd., the two firms being now combined. For the sake of alphabetical order, however, the two firms will be dealt with as if they were still entirely separate concerns.

Sir W. G. Armstrong Whitworth Aircraft, Ltd., will exhibit three complete aircraft: "The "Argosy" commercial triple-engined passenger machine, the "Atlas" Army Co-operation biplane, and the A.W. XIV single-seater fighter. All three machines, it is almost superfluous to state, are fitted with Armstrong-Siddeley "Jaguar" engines.





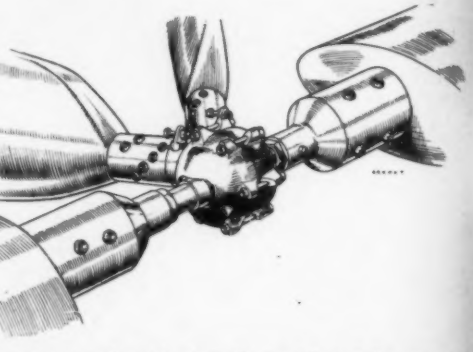
A typical fuselage joint and wing root attachment on the "Argosy" Passenger Aeroplane. ("FLIGHT" *Sketch.*)



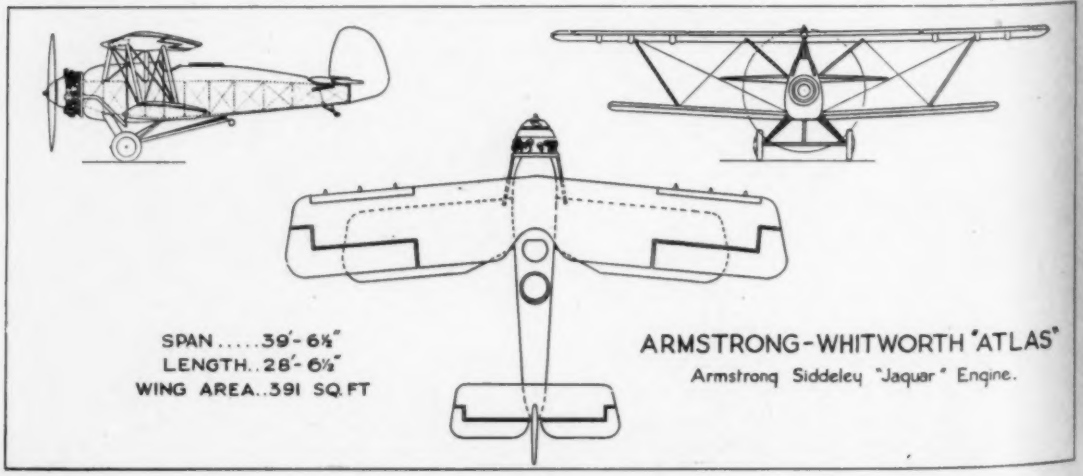
Attachment of undercarriage strut to lower plane on the "Argosy" Passenger Aeroplane. ("FLIGHT" *Sketch.*)

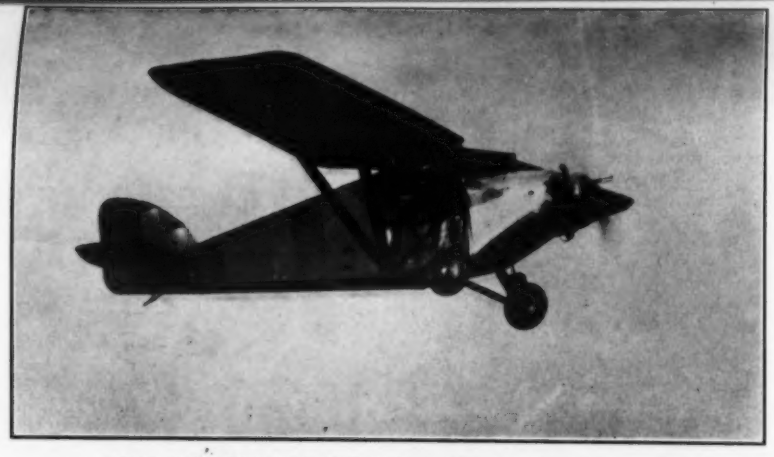
The Armstrong Whitworth "Argosy" has been in regular use on the air routes of Imperial Airways, Ltd., for a long period, and has given excellent service both as regards reliability and what the Germans term *Rentabilitat, i.e.*, commercial economy. In fact, it may probably be said that the "Argosy" is one of the most economical commercial aeroplanes in service at the present time, bearing in mind that the type is fitted with three engines and therefore should be, theoretically at least, immune from forced landings away from an aerodrome, owing to its ability to continue flight with one of its three engines out of action. The earlier "Argosies" were fitted with direct-drive "Jaguar" engines. The latest types, delivered to Imperial Airways this year, incorporate a number of improvements, among which not the least important is the fitting of geared instead of direct-drive "Jaguars." Not only does this mean a better propeller efficiency, and, therefore, greater thrust horse-power, but also the ability to carry a greater pay load per horse-power, or, conversely, a greater percentage of power in reserve. Put in another way, with geared engines the ability to continue flight with one of the three engines stopped is improved, and the likelihood of a forced landing should, in the new "Argosies," be reduced almost to vanishing point.

What adds further to the efficiency of the latest type of "Argosy" is the fitting of "Townend" rings over the engines. This is not the place for a detailed description of this new piece of equipment, but briefly it may be explained that the "Townend ring" is a metal ring, sometimes of aerofoil section and sometimes just of plain sheet metal bent to a camber, fitted around the outside of the cylinder heads of a radial engine. In a measure the "Townend ring" acts in a manner similar to that of the Handley Page automatic wing tip slot in that it causes the air flowing past the engine to converge upon and follow the surfaces of the fuselage or nacelle behind the engine, instead of breaking away to form vortices, as the disturbed air behind a radial engine is otherwise apt to do. This is not a very scientific, nor, we fear, very accurate, explanation, but it will, at least, serve to indicate the *raison d'être* of the "Townend ring"



The axles on the "Argosy" are hinged by means of universal joints. ("FLIGHT" *Sketch.*)





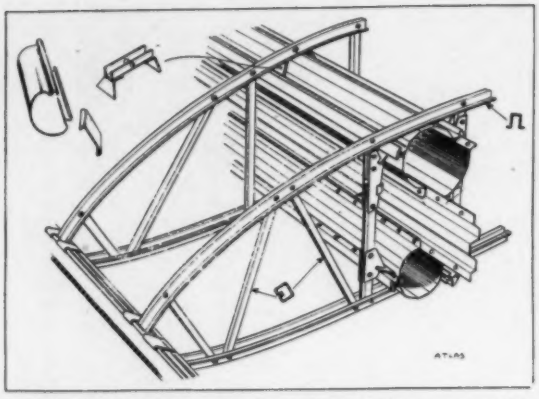
A.B.C. "ROBIN" (A.B.C. "Scorpion"). ("FLIGHT" *Photo.*)

ARMSTRONG WHITWORTH "ARGOSY" (3 Armstrong Siddeley "Jaguar").

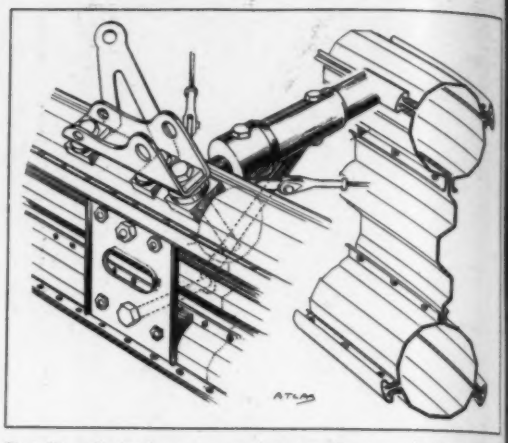
ARMSTRONG WHITWORTH "ATLAS" (Armstrong Siddeley "Jaguar").

ARMSTRONG WHITWORTH "A.W. XIV" (Armstrong Siddeley "Jaguar").

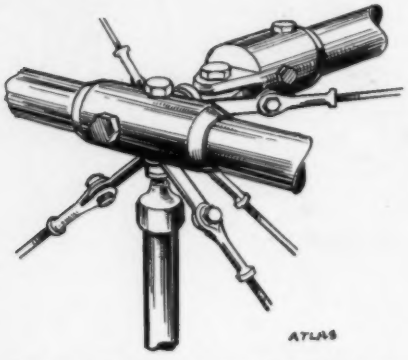
AT OLYMPIA



Metal ribs and their attachment to main spar on the Armstrong Whitworth "Atlas." ("FLIGHT" *Sketch.*)



Details of steel spars and interplane and drag strut attachments on the "Atlas." ("FLIGHT" *Sketch.*)



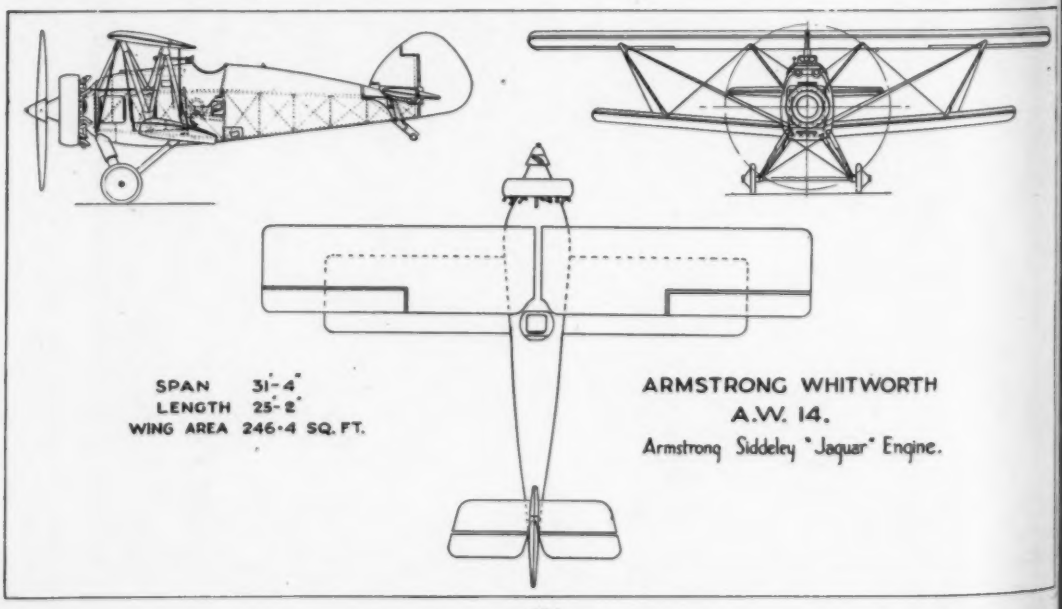
A typical fuselage joint as used on the Armstrong Whitworth "Atlas." ("FLIGHT" *Sketch.*)

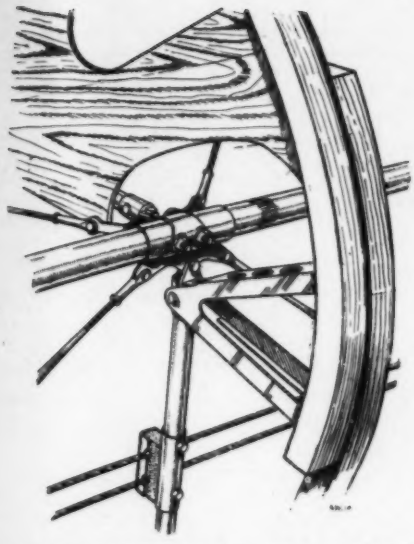
which will be found on several of the aircraft exhibited at Olympia this year.

In the case of the "Argosy," for example, the effect of fitting the "Townend ring" is to reduce by a very large percentage the drag of three radial air-cooled engines, which at once means a greater reserve of power, or surplus of "power available" over "power required." Advantage can, of course, be taken of this in two ways: By saving fuel for a given journey or, by running at the same thrust horse-power, to reduce the duration of the journey by adopting a higher cruising speed. Looked at from any point of view, the fitting of the "Townend ring" spells greater efficiency.

Other features marking improvement in design are incorporated in the latest type of "Argosy." For example, the ailerons are no longer operated by the pilot *direct*. Mounted behind the trailing edge of the lower wings, one on each side, is a servo-rudder whose surface is in a vertical plane. These servo-rudders are connected up to the ailerons in such a manner that, when the pilot operates the servo-rudders in one direction, the air forces on them are such as to raise the ailerons on one side and depress those on the other. The *direction* of operation of the servo-rudders has been so arranged that if the aircraft begins to sideslip, the air forces on the servo-rudders at once cause these to move in the direction desired for getting the aircraft out of the sideslip. This, of course, is a function of usefulness which the ordinary balanced aileron cannot perform.

Altogether the new "Argosy" is an uncommonly interesting machine, and will be found well worth a visit and inspection. Structurally, the machine to be shown at Olympia will not be found to differ greatly from the old models, which are already well known to readers of FLIGHT. The fuselage is a





The type of fuselage joint employed in the "A.W.14," and details of the formers and their attachment to the main structure. ("FLIGHT" *Sketch.*)

steel tube structure with bolted joints, while the wings have box spars of corrugated steel strip construction, and steel wing ribs.

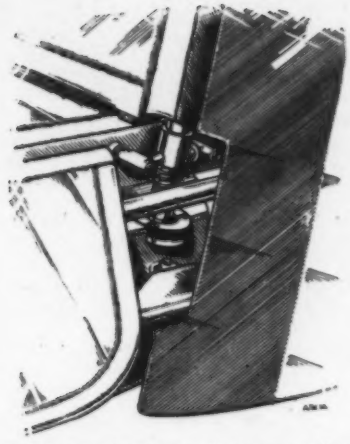
The "Argosy" has a saloon with seating accommodation for 20 passengers, and in this connection it is of interest to note that when the machine carries fuel for a flight of 3½ hours' duration, the pay load is 5,000 lbs. In addition to the saloon, the "Argosy" has two large luggage compartments, one in front of the saloon, *i.e.*, below the pilot's cockpit, and a larger one aft of the saloon.

The petrol tanks have a capacity of 360 gallons, and are housed in the top plane, whence they provide direct-gravity feed to the engines. As the "Argosy" cruises at a speed of 95 m.p.h. on a fuel consumption of 65 gallons per hour, this tankage gives an endurance of about 5½ hours. With any one of the three engines stopped the "Argosy" will fly easily on the remaining two at an altitude of 2,000 ft.

The main dimensions of the "Argosy" are: Length o.a., 67 ft.; wing span, 90 ft. 4 in.; wing chord (top), 12 ft.; wing chord (bottom), 10 ft.; overall height, 20 ft.; wing area, 1,874 sq. ft.

The tare weight is 12,090 lbs., and the gross weight 19,200 lbs. The load carried may be divided as follows:—Fuel and oil, 2,110 lbs. Paying load, 5,000 lbs. Performance figures are not available.

The second machine to be exhibited on the Armstrong Whitworth stand will be an "Atlas" Army Co-operation two-seater of the type in use by the British Royal Air Force. When used for this purpose the armament consists of two machine guns, camera, wireless, and gear for picking up messages. The "Atlas" may, however, also be used for



Trunnions are employed in the nut and worm tail trimming gear of the Armstrong Whitworth "A.W.14." (FLIGHT "*Sketch.*)

light bombing, when it will carry, for instance, four bombs of 112 lbs. each. A similar aeroplane, but without armament, is used for advanced training instructions. Finally, the "Atlas" can be supplied with a float undercarriage for use as a seaplane, or with a ski chassis for use on snow and frozen water.

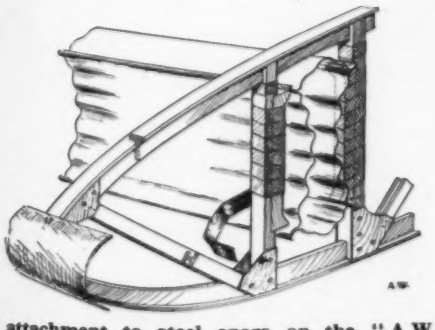
Constructionally the "Atlas" is an all-metal machine of normal Armstrong Whitworth construction, with steel tubular fuselage and all-steel wings. At Olympia the "Atlas" will be exhibited with a geared "Jaguar" engine provided with "Townend ring."

The main dimensions of the "Atlas" are:—Length o.a., 28 ft. 6 in.; wing span, 39 ft. 6 in.; wing chord (top), 6 ft. 7 in.; wing chord (bottom), 5 ft. 7 in.; wing area, 391 sq. ft.

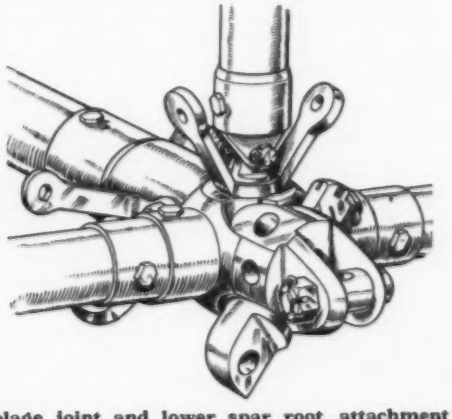
With a petrol capacity of 75 gallons and an oil capacity of 7 gallons, the endurance is 3½ hours when fitted with the geared "Jaguar." The gross weight is 4,115 lbs., and the military load 880 lbs.

The following performance figures for the "Atlas" land-plane refer to the geared "Jaguar" fitted with "Townend ring," and to a gross weight of 4,115 lbs.:—Speed at ground level, 149 m.p.h.; at 5,000 ft., 145 m.p.h.; at 10,000 ft., 140 m.p.h.; at 15,000 ft., 131 m.p.h. Climb to 5,000 ft., 4·25 mins.; to 10,000 ft., 10·5 mins.; to 15,000 ft., 21·75 mins. The service ceiling is 17,700 ft., and the absolute ceiling is 19,100 ft.

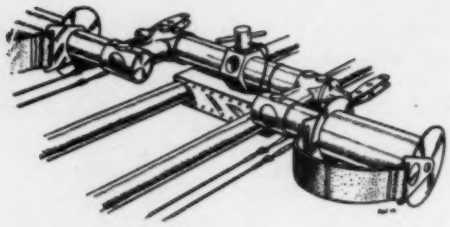
The Armstrong-Whitworth "A.W. XIV" is a single-seater fighter generally similar to the well-known "Siskin" type, but carries less equipment, with the result that its speed and rate of climb are greater. At the exhibition the "A.W. XIV" will be shown fitted with supercharged Armstrong Siddeley "Jaguar" engine with "Townend ring."



Rib attachment to steel spars on the "A.W 14." ("FLIGHT" *Sketch.*)



Fuselage joint and lower spar root attachment on "A.W.14." ("FLIGHT" *Sketch.*)



The adjustable rudder pedals on the "A.W.14."
("FLIGHT" *Sketch.*)

Structurally the machine is of normal Armstrong-Whitworth all-steel construction, and aerodynamically the "A.W. XIV" is characterised by the use of a bi-convex wing section, with almost stationary centre of pressure. A result of the use of this wing section is that the wing bracing is unusual, there being no bracing in the plane of the rear spars.

The main dimensions of the "A.W. XIV" are:—Length o.a., 25 ft. 2 in.; wing span (top), 31 ft. 4 in.; wing span (bottom), 23 ft. 9 in.; top chord, 5 ft.; bottom chord, 4 ft. 3 in.; wing area, 246 sq. ft.

When fitted with the supercharged "Jaguar" and loaded to a gross weight of 3,095 lbs., the "A.W. XIV" has the following performance, the military load being 400 lbs. and the petrol and oil 46 gallons and 5½ gallons respectively—Speed at 10,000 ft. (engine throttled), 173 m.p.h.; at 15,000 ft., 177·5 m.p.h.; at 20,000 ft., 161·5 m.p.h. The climb to 10,000 ft. occupies 7 mins.; to 15,000 ft., 11·5 mins.; and to 20,000 ft., 17·5 mins. The service ceiling is 27,600 ft., and the absolute ceiling, 28,900 ft.

Just as we are about to go to press with this week's issue of "FLIGHT," we are informed that the "Argosy" will not be shown at Olympia, as it is required for the air routes. A "Siskin" single-seater fighter will be shown instead.

BLACKBURN AEROPLANE & MOTOR CO., LTD.

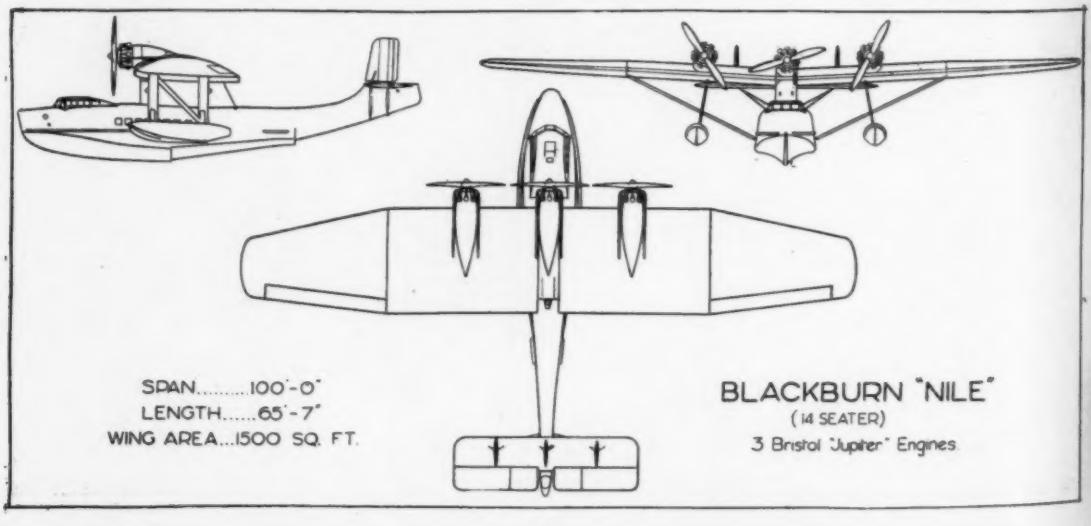
IN addition to the machines exhibited on their own stand, the Blackburn Aeroplane and Motor Co. will have on view two "Bluebirds." These, however, will be exhibited on the stand of Auto Auctions, Ltd., who have been appointed sole world concessionnaires for this type of light 'plane. The descriptions of the "Bluebirds" will, however, be found at the end of the notes dealing with the aircraft shown on the Blackburn stand, and readers are reminded that prospective purchasers should apply to Auto Auctions, Ltd., for more detailed information than can be given in the limited space we have available.

On the Blackburn stand itself four complete machines will be exhibited, or rather three complete machines and one large flying-boat hull, for the wings of which there is not sufficient room at Olympia. The four machines are: The hull of the "Nile" commercial flying-boat, a "Ripon II" torpedo, bomber or reconnaissance biplane, the "Lincock" light single-seater fighter, and the "Nautilus" reconnaissance deck-landing fighter.

The Blackburn "Nile" will, in some ways, be one of the most interesting exhibits in Olympia. To begin with, it is a very large all-metal flying boat, which fact in itself entitles it to a close inspection. Then it is the first British commercial all-metal monoplane flying-boat to be constructed, the monoplane wing arrangement not hitherto having been employed on any British flying-boat designed for commercial work. The absence of a superstructure will partly prevent visitors from obtaining an exact idea of what will be the appearance of the machine when finished, but the general arrangement drawings which we publish should help materially in showing the machine as a whole.

The "Nile" is a three-engined monoplane commercial flying-boat of all-metal construction, designed for long-distance over-sea passenger or cargo transport. Accommodation is provided for a crew of three, 14 passengers, and a load of luggage and mails. The boat hull is constructed of Duralumin, with stainless steel fittings. The lines of the hull follow fairly closely those of the well-known Blackburn "Iris II," which has proved so successful over a considerable period of service. In the bows of the hull is an alternative station for the navigator, from which moorings can be picked up, and handling on the water supervised generally. Between this forward cockpit and the main control cockpit is an interior station for the navigator, with stowage for charts, navigation instruments, &c., and a table and chair.

The control cockpit, which is situated in front of the



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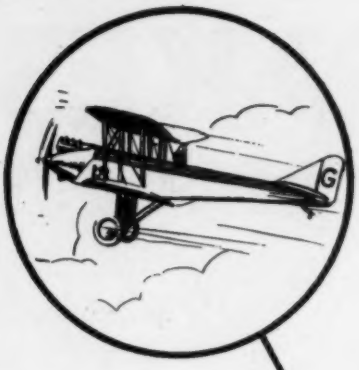

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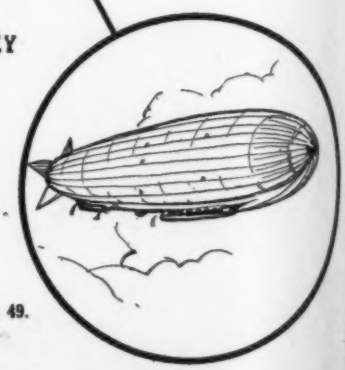

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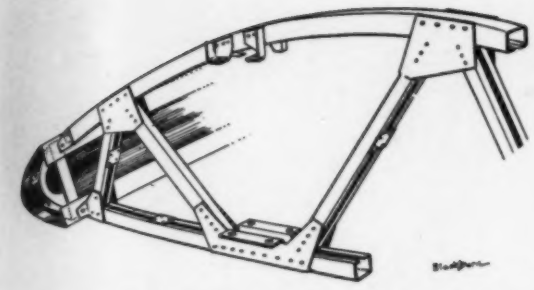


Construction of centre-section rib and leading edge on Blackburn "Nile." ("FLIGHT" *Sketch.*)

wing, is an enclosed cabin fitted with two seats, dual controls, flying instruments, etc. Being placed in front of the wing, the view from the pilots' cabin is very good.

A passenger saloon with seating accommodation for 14 occupants follows aft of the cockpit. The armchairs in the saloon have leather upholstery, and are arranged generally in groups of 4, two of which face forward and two aft, with a table between. Airspeed indicator, altimeter and clock are provided inside the saloon for the convenience of the passengers. Aft of the saloon is a lavatory, and the steward's pantry arranged for carrying food supplies, crockery and cooking stoves. Access to the saloon is by way of a hatchway at the rear, which is provided with accommodation ladders, one over the side and another leading into the interior. Behind the saloon hatchway is the compartment for luggage and mails.

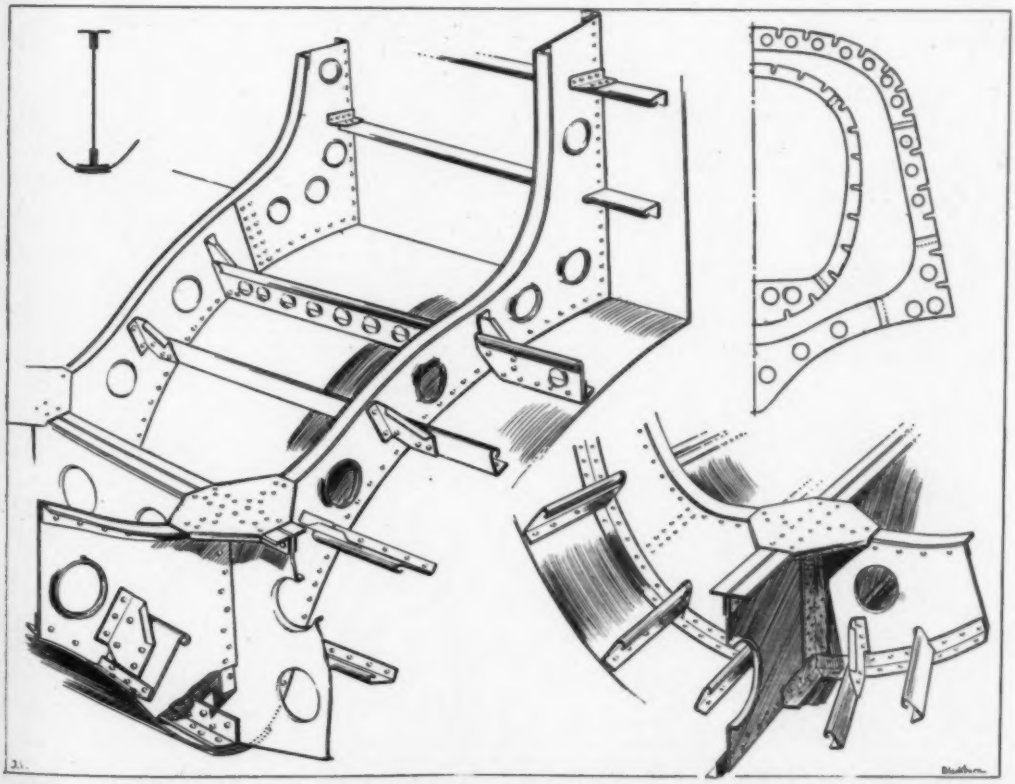
The monoplane wing is carried high above the water line to avoid risk of damage by high seas, and interference with the working of the engines. The wing is supported above the hull, at the centre by a faired structure of steel tubes, and at the extremities of the centre-section by sloping streamline steel tube struts from the hull. Two outboard floats maintain lateral stability on the water. These floats are placed relatively close to the main hull, below the wing bracing strut attachments. Structurally the monoplane wing, which consists of a centre-section and two end pieces, is built up of Duralumin box spars and Duralumin ribs. The wing tapers both in plan and elevation.

The power plant consists of three Bristol "Jupiter" engines carried in nacelles faired into the leading edge of the wing. The main petrol tanks are carried in the fairing between the hull and wing, and the petrol system includes pumps and distributor controls to three small service tanks, one in each engine nacelle. No petrol is carried inside the hull.

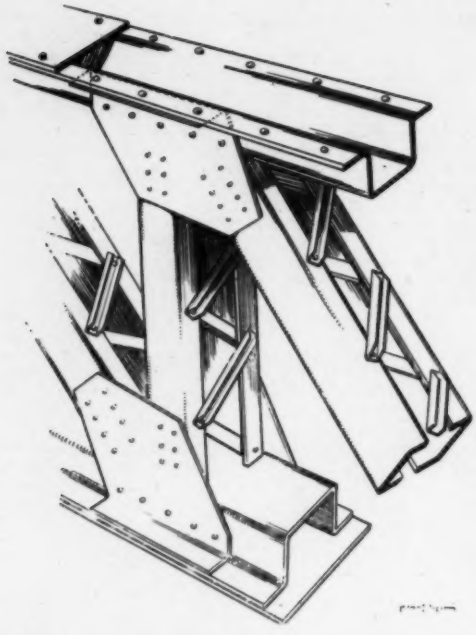
The main overall dimensions of the Blackburn "Nile" flying-boat are: Length o.a., 65 ft. 7 in.; wing span, 100 ft.; wing area, 1,500 sq. ft.; maximum chord, 17 ft.; minimum chord, 9 ft. The maximum thickness of the wing section is 2 ft. 4½ in.

Detailed weight figures are not available, but the estimated gross weight of the "Nile" is 20,700 lbs., and the total load carried is 5,950 lbs. As the machine has not yet been completed, the following performance figures are necessarily *estimated*: Full speed at sea level, 107 knots; cruising speed, 87 knots; landing speed, 52 knots. The initial rate of climb is 700 ft. per min.; and the service ceiling, 14,000 ft. The power loading is 14·1 lbs. per h.p., and the wing loading 13·8 lbs. per sq. ft. According to the proportion of pay load and fuel carried, the tankage is 340 gallons to 603 gallons, corresponding to durations of 4½ and 8 hours respectively.

The Blackburn "Ripon II" is designed for the alternative duties of torpedo operation, bombing or reconnaissance, and may be used as a landplane or seaplane, the wheel and float



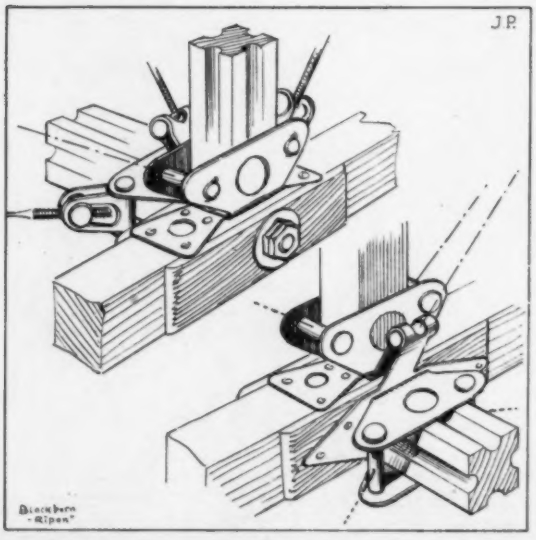
THE BLACKBURN "NILE" ALL-METAL FLYING BOAT: Details of the hull construction
("FLIGHT" *Sketches.*)



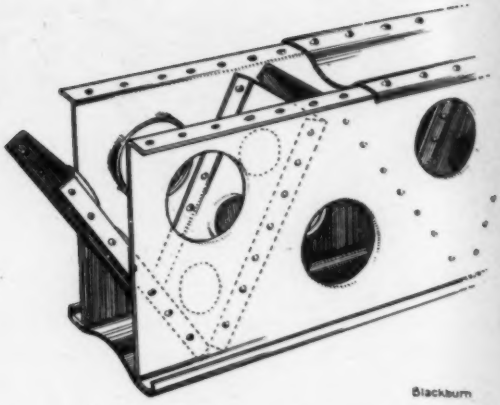
Details of the main spar (Duralumin) of the Blackburn "Nile" flying-boat. ("FLIGHT" *Sketch.*)

undercarriages being interchangeable. The machine is produced both in all-metal and composite form. The example to be shown at Olympia will be of the latter form of construction, and will be shown as fitted for torpedo operation work. The machine is a single-bay biplane, two-seater, and fitted with Napier "Lion XI A" engine.

The fuselage of the "Ripon II" is built in three detachable units: the steel tubular engine mounting, the steel tubular centre structure, and the tie-rod braced wood girder rear portion. There is accommodation for a crew of two, the pilot in front and the observer-gunner in the rear cockpit. The front cockpit is fitted with all flying controls, instruments, machine gun and torpedo release controls, etc. In the rear cockpit is the machine gun, wireless apparatus, navigation instruments, etc.



Fuselage fittings for wooden longerons on Blackburn "Ripon II." ("FLIGHT" *Sketch.*)



A main spar (Duralumin) in the tail plane of the Blackburn "Nile." ("FLIGHT" *Sketch.*)

The biplane wings are of composite construction, with spruce spars and ribs, metal compression struts and interplane struts. There is a top and a bottom centre-section, to the rear spar ends of which the wings themselves are hinged for folding. Ailerons are fitted to top and bottom planes.

The Napier "Lion" engine is mounted on a steel tubular engine mounting, and is neatly cowled in. A fireproof bulkhead separates the engine unit and the centre structure. Cooling is by two retractable side radiators. Petrol is carried in a large main tank inside the centre structure, whence it is pumped to a service tank in the top centre-section.

The undercarriage is of the divided type, each unit consisting of a bent axle, a radius rod and the telescopic oleo-pneumatic leg. Aluminium disc wheels with brake drums are fitted.

The dimensions of the "Ripon II" are: length, o.a., 36 ft. 9 in.; span, 45 ft. 6¼ in.; chord, 8 ft. 3 in.; wing area, 720 sq. ft. The gross weight of the "Ripon II" as a torpedoplane is 7,280 lbs., and the total load carried is 3,150 lbs.

When the "Ripon II" is equipped as a landplane the performance is: Full speed at sea level, 132·5 m.p.h.; cruising speed, 115 m.p.h.; landing speed, 59 m.p.h.; initial rate of climb, 800 ft. per min.; service ceiling, 13,000 ft.; absolute ceiling, 15,000 ft.; wing loading, 10·7 lb. per sq. ft.; power loading, 12·8 lbs. per h.p.; endurance, 4 hrs.

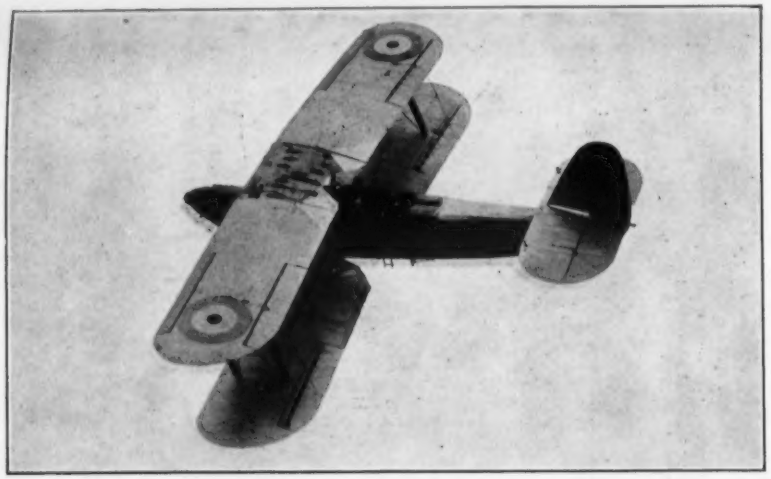
The "Ripon II" has recently been adopted by the British Air Ministry as the successor to the Blackburn "Dart," which has remained the standard torpedoplane since 1920. The type has also been adopted by foreign governments.

The latest type of Blackburn "Lincock" light single-seater fighter is the all-metal version of the previous wooden prototype. Originally designed as a high-performance single-seater fighter with relatively low power, the "Lincock" is now available with a number of alternative power units and, according to the engine fitted, possesses qualities which make it suitable for the additional alternative duties of training, fast mail-carrying, forest fire patrol work, &c. In spite of its relatively low power, the "Lincock" has a performance which is not very far short of that of many single-seater fighters of nearly twice the power. It is, moreover, a very economical machine both as regards first cost and maintenance.

The fuselage of the metal "Lincock" is composed of three detachable units: the engine mounting, the centre and cockpit structure, and the rear fuselage. The fuselage structure is entirely of steel tubes, all diagonal bracing being by struts instead of tierods. No welding is used, the joints between longerons and struts being steel plate fittings with bolts through the longerons and tubular rivets through the struts. Below the centre structure is a vee of steel tubes, the apex of which forms the attachment for the lower wings and undercarriage.

The biplane wings of the all-metal "Lincock" have main spars of special drawn sections of high-tensile steel strip, and ribs of duralumin. The upper wing is built as one complete unit, and the lower wing is in two halves attached at the centre to the vee already mentioned.

An undercarriage of the divided type is fitted, each chassis half consisting of bent axle, radius rod and telescopic leg. Wheel brakes are fitted. A feature of the design is that the



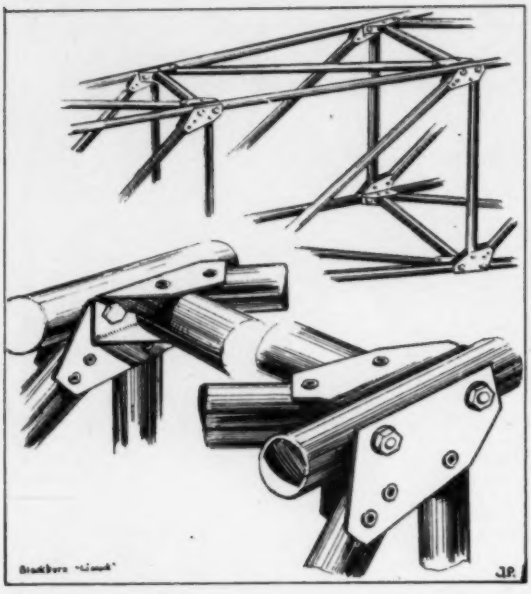
BLACKBURN "RIPON" (Napier "Lion"). ("FLIGHT" *Photo.*)

BLACKBURN "LINCOCK" (Armstrong Siddeley "Lynx"). ("FLIGHT" *Photo.*)

BLACKBURN "NAUTILUS" (Rolls-Royce "F").

BLACKBURN "BLUEBIRD" ("Cirrus" or "Gipsy"). ("FLIGHT" *Photo.*)

AT OLYMPIA



Round steel tubes are used in the fuselage of the Blackburn "Lincock," and the joints are by flat plates and tubular rivets. ("FLIGHT" *Sketches.*)

lower wing, although in two halves, does not interfere with the undercarriage when the wing has to be dismantled.

The engine, an Armstrong-Siddeley geared "Lynx" in the exhibition machine, is so mounted as to be completely accessible for all adjustments, and the entire engine may readily be changed. The petrol is carried in two tanks, one inside the fuselage and the other in the centre of the top plane. The supply from both to the carburettor is by gravity.

The pilot's cockpit is, in spite of the small size of the machine, comparatively roomy, and contains the usual flying controls, instruments, etc. The seat is of the parachute pack type, and when the "Lincock" is equipped as fighter the armament consists of two machine guns with interrupter gear. Provision can be made for carrying wireless.

The Blackburn "Lincock" has the following dimensions: Length, 19 ft. 6 in.; wing span, 22 ft. 6 in.; chord, 4 ft.; wing area, 170 sq. ft. The gross weight is 2,000 lbs., and the load carried 700 lbs.

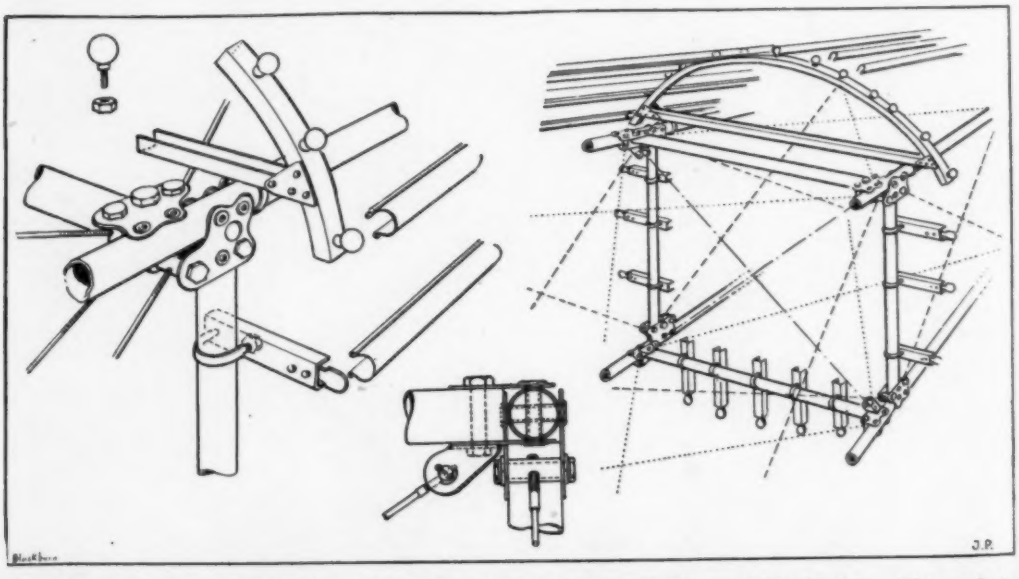
With the Armstrong-Siddeley geared "Lynx" the performance of the "Lincock" is as follows: Full speed, 155 m.p.h.; cruising speed, 130 m.p.h.; landing speed, 60 m.p.h. The initial rate of climb is remarkably good for the power, at 1,450 ft./min. The range is 390 miles, the service ceiling 20,000 ft., and the absolute ceiling 22,000 ft. The wing loading is 11·3 lbs./sq. ft., and the power loading 8·9 lbs./h.p.

Unfortunately it is not possible to refer in any detail to the fourth machine to be exhibited, as it has been built for the Air Ministry and is still regarded as more or less "secret." The "Nautilus," as this machine has been called, is a two-seater biplane of all-metal construction, fitted with Rolls-Royce "F" type engine. The "Nautilus" has been designed as a deck-landing two-seater reconnaissance fighter.

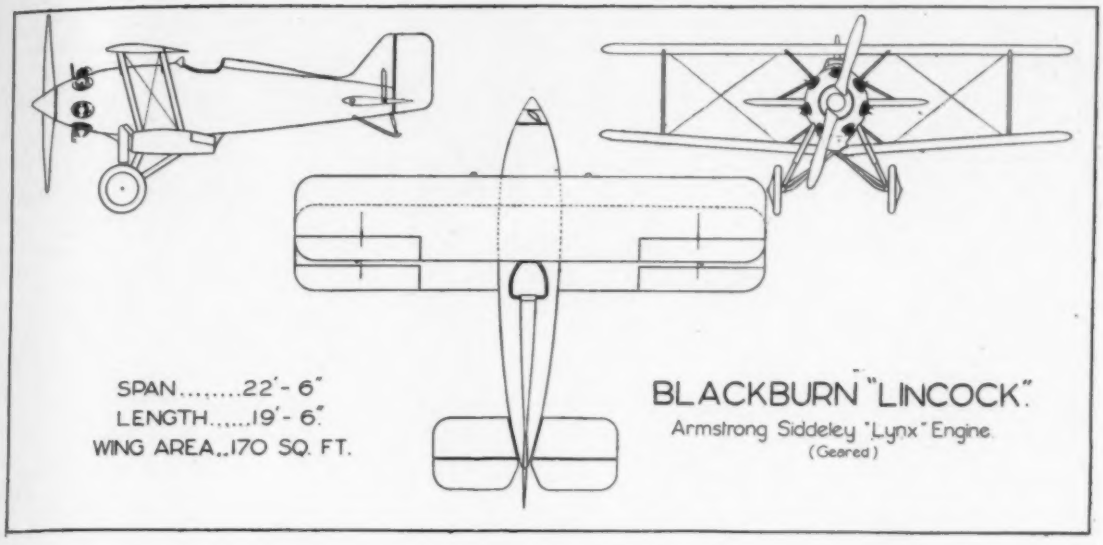
As mentioned above, two Blackburn "Bluebirds" Mark IV, will be exhibited on the stand of Auto-Auctions, Ltd. One of these will be a new machine fitted with "Cirrus III" engine, while the other will be the first all-metal "Bluebird" ever built, the actual machine on which Squadron-Leader Slatter flew from England to South Africa on a holiday during March and April of this year. Thus visitors to Olympia will have an excellent opportunity to inspect a machine that has already covered many thousands of miles, and to see for themselves how it has stood up to the work. Squadron-Leader Slatter's machine is fitted with a De Havilland "Gipsy" engine. The "Bluebird" can also be supplied as a seaplane, and on the stand of Auto-Auctions, Ltd., there will be on view an undercarriage of the two-float type, the floats being of duralumin. This float undercarriage will be the actual one used by Col. the Master of Sempill on a large number of flights in the period from August last year until quite recently, when the undercarriage was returned to the Blackburn works for reconditioning.

Except for the difference in power plants, the two "Bluebird IV" machines exhibited will be almost identical, and the following notes may, therefore, except where otherwise stated, be assumed to apply to both machines.

The "Bluebird IV" is designed for use by flying clubs, private owners and flying schools. A unique feature of its design is that the two occupants are seated side by side, and not in tandem as is the case in other light 'planes. As already mentioned, it can be supplied either as a land machine or as a seaplane, the two undercarriages being interchangeable. Handley Page automatic wing tip slots and a coupé head

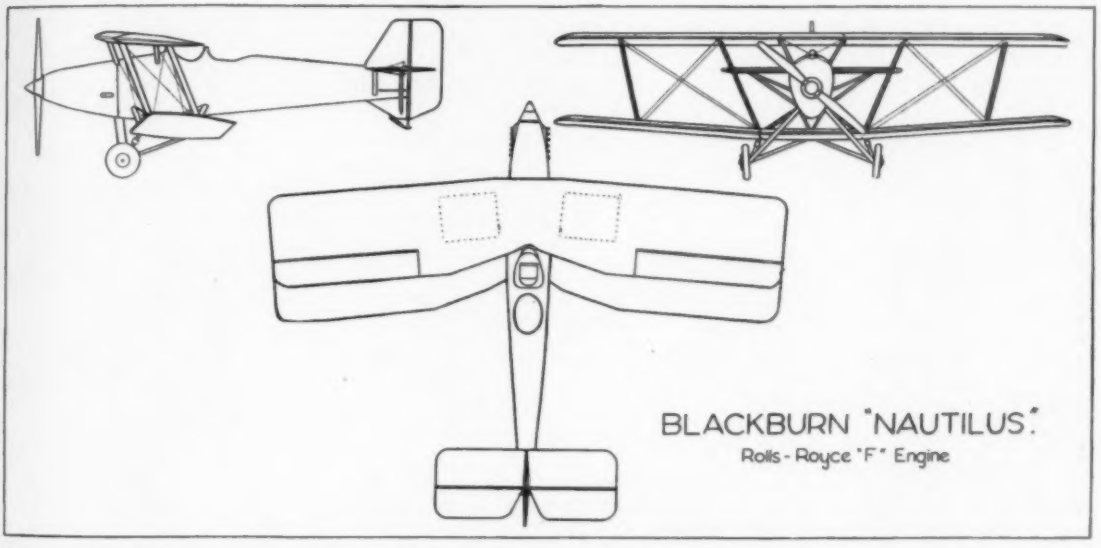


A very simple form of joint is used in the fuselage of the Blackburn "Bluebird." The stringers which support the fabric fairings are U-section strips, supported on short channel arms, as shown. ("FLIGHT" *Sketches.*)

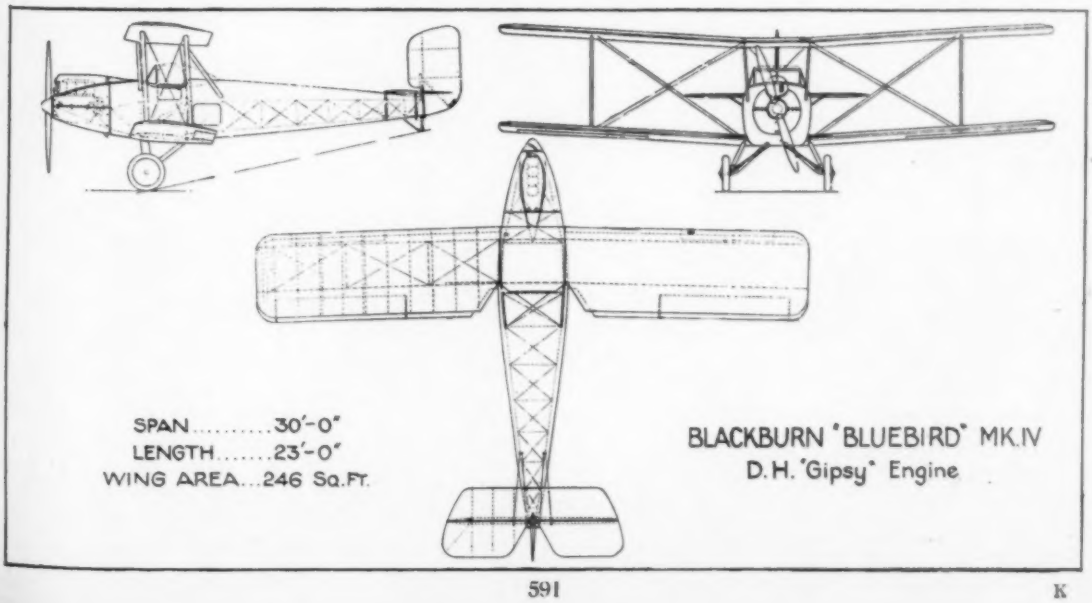


SPAN.....22'-6"
LENGTH.....19'-6"
WING AREA..170 SQ. FT.

BLACKBURN "LINCOCK."
Armstrong Siddeley "Lynx" Engine
(Geared)



BLACKBURN "NAUTILUS."
Rolls-Royce "F" Engine



SPAN.....30'-0"
LENGTH.....23'-0"
WING AREA...246 Sq.FT.

BLACKBURN "BLUEBIRD" MK.IV
D.H. "Gipsy" Engine

can be supplied at extra cost. One of the "Bluebirds" exhibited will have the "Cirrus III" engine and the other the De Havilland "Gipsy," but power plants such as the "Hermes" and the Armstrong-Siddeley "Genet" are also suitable.

The fuselage is of all-metal construction, steel being the material most extensively used. It consists of four detachable units: engine mounting, centre and cockpit section, rear fuselage, and stern unit. For the "in-line" types of engine the engine mounting is of steel tubular construction, but for the "Genet" a duralumin plate is used. The centre and cockpit structure has steel tube longerons and duralumin transverse frames. The rear fuselage portion has struts and longerons of steel tube, while the sternpost unit is of similar construction, with a steel tubular sternpost. Joints between struts and longerons are made by steel plate fittings, and tubular rivets through longerons and struts. The whole structure is about the nearest approach to "Meccano" construction which has yet been evolved, and should be remarkably serviceable in spite of its simplicity and cheapness.

The cockpit has, as already stated, side-by-side seating arrangement, and dual controls are fitted, one set of which is easily detachable if the machine is wanted for passenger-carrying. The seats may be tipped up, or easily removed altogether, to give access to the controls, and the floor of the cockpit has detachable floor boards which can also be easily removed. The instruments are neatly arranged on a small dashboard, with a pigeon hole on each side for small personal articles such as gloves, goggles, etc. A luggage compartment capable of holding two average size suitcases is provided behind the cockpit, with access through a side door. Another compartment for long articles such as golf clubs, guns, fishing rods, etc., is let into the top of the fuselage behind the cockpit. Side doors give easy access to the cockpit itself.

The biplane wings are also of all-metal construction, with very simple drawn section spars of high-tensile steel strip. Ailerons are fitted to the bottom planes only. The top centre-section is formed by a tank of aerofoil section, and this tank is easily removed when the wings are folded. The standard tank has a capacity of 22 gallons, but a 30-gallon tank can be fitted if desired.

An undercarriage of the divided type is fitted, each half being composed of a bent axle, a radius rod and the telescopic leg. The latter incorporates a metal springing device and an oil dashpot.

Main dimensions of the "Bluebird IV" are: Length, o.a., 23 ft. 2 in.; wing span, 30 ft.; width, folded, 9 ft. 10 in.; chord, 4 ft. 6 in.; wing area, 270 sq. ft. The normal gross weight is 1,496 lbs., and the total load carried 536 lbs.

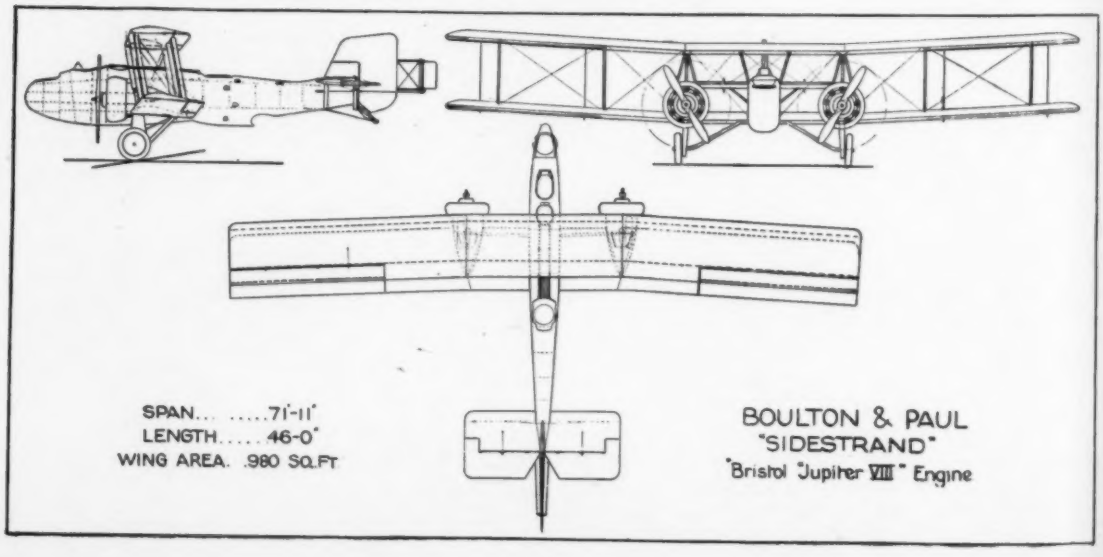
As a land machine with "Cirrus III" engine the "Bluebird IV" has the following performance:—Full speed, 107 m.p.h.; cruising speed, 82 m.p.h.; landing speed, 45 m.p.h.; climb from ground level, 780 ft./mins.; service ceiling, 15,000 ft.; normal range, 330 miles.

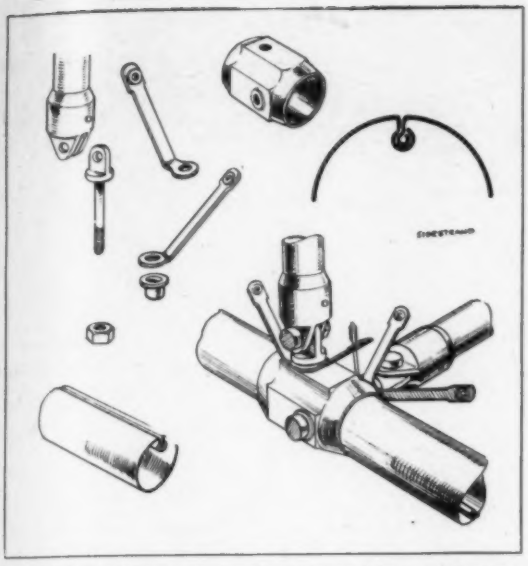
BOULTON & PAUL, LTD.

IT is not entirely certain who first thought of exhibiting an aircraft with its fabric stripped off on one side, up to the centre line, the machine being covered from the centre line to the wing tips on the opposite side. During the war a number of captured German aircraft were on view at the Agricultural Hall, Islington, and Sergeant Turner, who was in charge of the work of erecting the German machines for exhibition purposes, had the idea of stripping one side, leaving the other covered. The effect was extraordinarily good, as one was able to examine every constructional detail on one side of the machine while, by walking over to the other side, one saw the machine as it appeared when completely covered. It may be that this form of showing had been done previously. Personally we do not remember, but it would be difficult to imagine a better way of exhibiting an aircraft, provided the exhibitor really wishes all the details to be seen.

On the Boulton & Paul stand visitors to Olympia will have an opportunity to see the latest type of "Sidestrand" so exposed, and as this machine is extremely interesting in all three main respects: Structural design, aerodynamic design, and internal equipment, the Boulton & Paul stand will be well worth visiting.

It has usually been taken for granted that an aircraft with engines on the wings must of necessity be less efficient, aerodynamically, than one in which the entire power plant is housed in the fuselage. In other words, that of two machines, one a single-engined and the other a multi-engined, having the same wing loading and the same power loading, the single-engined type will always have the better performance. The difference cannot be entirely accounted for in the usual performance estimates, in which one adds the drag of individual components, and the extra drag of the multi-engined type is usually put down to "interference" between adjacent components. As a result of numerous wind tunnel and full-scale experiments, Boulton & Paul have been able to produce a series of twin-engined machines in which this interference effect has gradually been lessened, until in the "Sidestrand III" which will be exhibited, the performance is about equal to that which would be expected from a single-engined machine with the same power loading and wing loading.





Magnesium sleeves or pads are used in making the fuselage joints in the Boulton & Paul "Sidestrand." The longerons are "locked joint" tubes made from steel strip. ("FLIGHT" *Sketches.*)

The "Sidestrand" is a three-seater medium-range day bomber fitted with two Bristol "Jupiter" engines, which carries fuel for a range of 700 miles at 130 m.p.h., and a military load which includes 500 lbs. of bombs, three defensive gun positions—which between them leave no "blind spots"—ammunition, sending and receiving wireless, oxygen apparatus, parachutes, etc., etc. The machine is an equal-winged biplane, slightly staggered, and with a small sweep-back to the sections of the wings outside the engines.

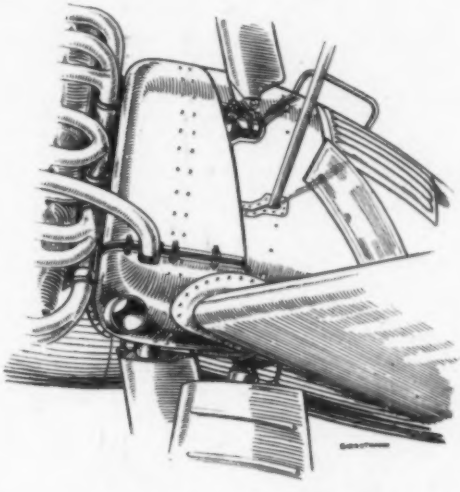
The upper wing is built in three, the lower in four sections. The two lower centre sections are attached to the lower longerons of the fuselage, and carry at their outer ends the engine mounts. Below the engines are attached the under-carriage legs, and extending above the engine mounts are struts to support the upper centre section. Outside the engines the outer sections of the wings are connected by two pair of interplane struts on each side, together with the usual streamline wire bracing. "Frise" type ailerons are fitted to both top and bottom wings.

The fuselage is built on a rectangular framing and provided with domed top and bottom fairings. It is of a form developed by experiment to give a remarkably low resistance. The body is very narrow in comparison with its depth, a fact which allows an excellent view downward over both sides to all members of the crew, and at the same time gives ample room for the stowage of the very complete military equipment carried. It is specially to be noted that the main bomb load in this machine is carried within the lines of the lower fuselage fairing, an arrangement which markedly reduces the resistance of the loaded machine.

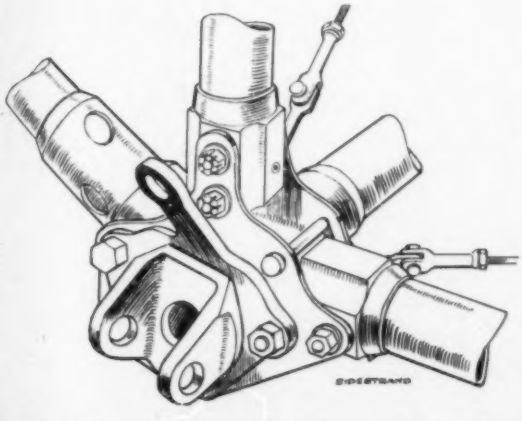
In the extreme nose of the fuselage is a forward gun position with Scarff ring and Lewis gun. Below this is a prone bombing position. Just aft of this gun position is the pilot's seat, and immediately behind is a second open cockpit below, where the wireless gear is arranged. A walk way beneath the pilot's seat gives access from the nose gun and bombing position to this cockpit.

The extreme nose of this fuselage is a separate monocoque structure, hinged to the fuselage frame, which can be opened. This gives access to the interior equipment, much of which is arranged on panels which can be withdrawn for overhaul and readjustment with remarkable ease.

Aft of the wings is a tail gun position, comprising a Scarff ring mount and Lewis gun at the top of the fuselage, with a prone gunning position below it from which a clear field of fire below the tail is obtained. Forward of this rear position stowage and mountings for a camera are provided. The main fuel tanks are carried in the fuselage below the upper centre section.



New cowling and air intake arrangement on "Sidestrand." Note the oil cooler on top of the fairing. ("FLIGHT" *Sketch.*)

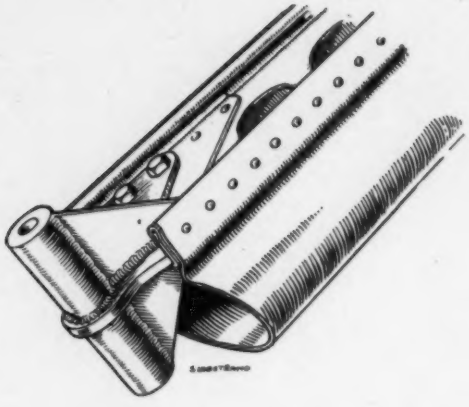


Fuselage joint and wing root attachment on the Boulton & Paul "Sidestrand." ("FLIGHT" *Sketch.*)

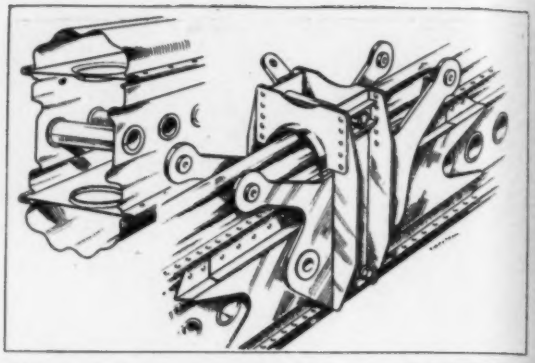
The two engines are carried, one on each side, in streamlined nacelles built on to the lower centre sections of the wings. Each engine mount proper is carried on a frame or "gate" hinged to the nacelle structure in such a way that the whole engine may be swung round to give access to the auxiliaries at the rear without the need for disconnecting any fuel, oil or control connections. The pins on which these gates swing are hardened and ground taper to fit accurately into the hinge blocks, and as a result opening and closing of these gates is never attended with any difficulties caused by drooping of the gate on its hinges. Oil tanks are arranged in the nacelles behind the engines, and the whole assemblage is faired by easily removable but substantial cowling.

The undercarriage—of very wide track—consists of a pair of "Vees" below each engine nacelle, each supporting an axle hinged to the lower edge of the fuselage below the front spar attachment. The front leg of each pair of Vees is telescopic, and incorporates compressed air springing together with an oil damping system. This type of undercarriage leg is covered by Boulton and Paul patents, and has proved to be exceedingly satisfactory in service.

The tail unit is of normal monoplane type, fitted with adjustment gear for the tail plane, elevators having the Boulton and Paul type of "shielded horn" balance, and a rudder which is both horn-balanced and fitted with a servo-



Main structure of metal interplane strut as used on the "Sidestrand." A fairing completes the strut. ("FLIGHT" *Sketch.*)



Main wing spars and interplane strut attachment thereto on the "Sidestrand." ("FLIGHT" *Sketches.*)

control. This consists of a small auxiliary rudder carried behind the main rudder on outriggers. This auxiliary is operated from the pilot's rudder bar by crossed wires, so that it is moved in the opposite sense to that in which it is desired that the main rudder should move. The resulting air force on the auxiliary rudder then tends to force the main rudder in the desired direction, and thus relieves the pilot of a large proportion of the operating loads. As a result it is possible to turn the "Sidestrand" against one engine, the other being switched off, in steeply banked turns, without undue effort.

Except for the fabric covering and for certain fairings which are of three-ply and spruce, the "Sidestrand" is of all-metal construction. Both steel and aluminium alloys are used, the choice of material being dictated by the loading conditions of the individual members concerned.

The main dimensions of the "Sidestrand" are: Length, overall, 41 ft.; wing span, 72 ft.; wing chord, 7 ft. 9 in.; wing area, 980 sq. ft. The tare weight is 6,010 lbs., and the gross weight 10,200 lbs., the load being made up as follows: Petrol (230 gallons), 1,780 lbs.; oil (23 gallons), 230 lbs.; crew (3 with parachutes), 600 lbs.; military load, 1,580 lbs.

Following are the official performance figures of the Mark II "Sidestrand" fitted with "Jupiter VI" engines. Full speed at 5,000 ft., 130 m.p.h.; at 10,000 ft., 129 m.p.h.; at 15,000 ft., 122 m.p.h.; at 20,000 ft., 106 m.p.h. Climb to 5,000 ft. in 5 minutes; to 10,000 ft. in 10·5 minutes; to 15,000 ft. in 19 minutes; and to 20,000 ft. in 35·5 minutes. The service ceiling is 21,500 ft., and the landing speed, 51 m.p.h.

The actual machine to be exhibited at Olympia will be a Mark III "Sidestrand," fitted with geared "Jupiter VIII" engines housed in special nacelles, and fitted with Townend rings. These changes result either in the machine being able to carry a greater military load, or with the same load a marked increase in performance is to be expected. For instance, it is estimated that the full speed at 10,000 ft. will be about 140 m.p.h., and that the ceiling will be at least 23,000 ft.

In addition to the "Sidestrand," there is, we learn, just a possibility that an entirely new machine may be exhibited by Boulton and Paul, Ltd. For reasons into which we need not enter here it is not desirable to say anything more at present Should the new machine be shown it will be dealt with in next week's issue of FLIGHT.

It will be known to most of our readers that Boulton and Paul made the whole of the framework for the new rigid airship R.101. This framework necessitated methods of design and construction never hitherto attempted, and although the work was, as regards dimensions of components, on an almost gigantic scale, the accuracy demanded was of the "watchmaker's" variety. Visitors to Olympia will have an opportunity to examine for themselves some of the airship components made by this firm, and our advice to them is not to miss it. The work represents engineering in possibly one of its highest forms.

THE BRISTOL AEROPLANE CO., LTD.

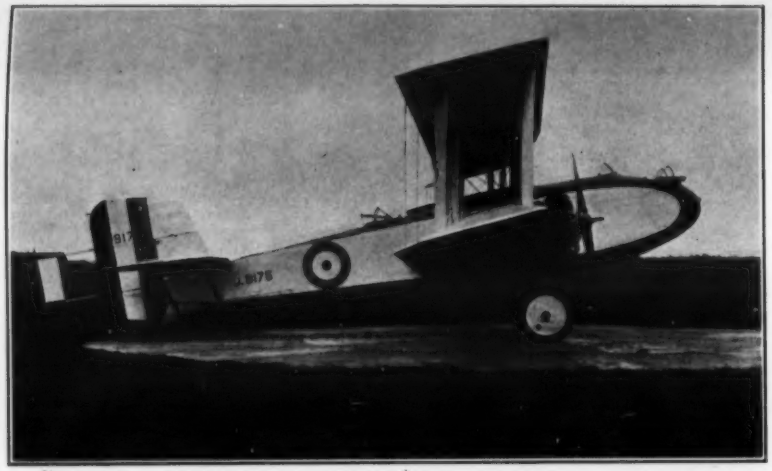
Two complete aeroplanes will be exhibited on the stand of the Bristol Aeropane Co., Ltd., one a single-engined four-seater passenger machine with Bristol "Neptune" engine, and the other a "Bulldog" single-seater fighter with Bristol "Jupiter."

The new Bristol four-passenger commercial aeroplane is a saloon machine, carrying the official works type number 110A. As was to be expected from the Bristol firm, the saloon will be most comfortably equipped and with the finish one has come to expect from all "Bristol" products. The machine, apart from its individual appeal, is of interest as being the second or third of what may be termed the "feeder line" type of aircraft to be produced in this country. In the United States the three or four-seated single-engined type of machine has long been popular, but in this country we have hitherto had little experience of this class of machine. It may be said that what has, in the case of the Bristol company, made the 110A possible is the production of two new types of "Bristol" engines: the five-cylinder "Titan" and the seven-cylinder "Neptune." These engines, of which the "Neptune" will make its first public appearance at Olympia, make use of a certain number of "Jupiter" parts, such as cylinders, pistons, connecting rods, &c. The new 110A may be supplied with either engine, but at the Show it will be fitted with the more powerful of the two, *i.e.*, the "Neptune," rated at 295-315 h.p.

From the general arrangement drawings it will be seen that the Bristol 110A is a biplane in which the pilot's cockpit is placed between the saloon and the engine, ahead of the pings. The pilot's seat is placed on the port side, and the cockpit communicates with the saloon by a door, while the pilot is able, by means of a door on the starboard side, to enter and leave his cockpit without going through the saloon. In front of the pilot is a windscreen of "Triplex" glass, while on the sides are panels of clear celluloid. The pilot's seat is of the bucket type, and its height is adjustable in flight through a range of four inches. The controls are of normal type, with a rudder bar adjustable in flight for fore and aft position.

All the bearing surfaces of the controls are provided with grease-gun lubrication. On the port side is mounted the tail trimming wheel. The instruments fitted as standard include altimeter, airspeed indicator, cross level, compass, revolution counter, oil-pressure gauge, oil thermometer, watch, engine magneto switch and hand starter magneto switch.

The saloon is 6 ft. long by 3 ft. 6 in. wide, and has seating accommodation for four passengers. The two front seats have back rests to fold down, and, in addition, one of them is hinged to fold against the wall of the saloon so as to allow of easy access to the pilot's cockpit. The seats at the rear are of the sofa variety, extending right across the saloon. All seats are upholstered in leather, and are pneumatically inflated.



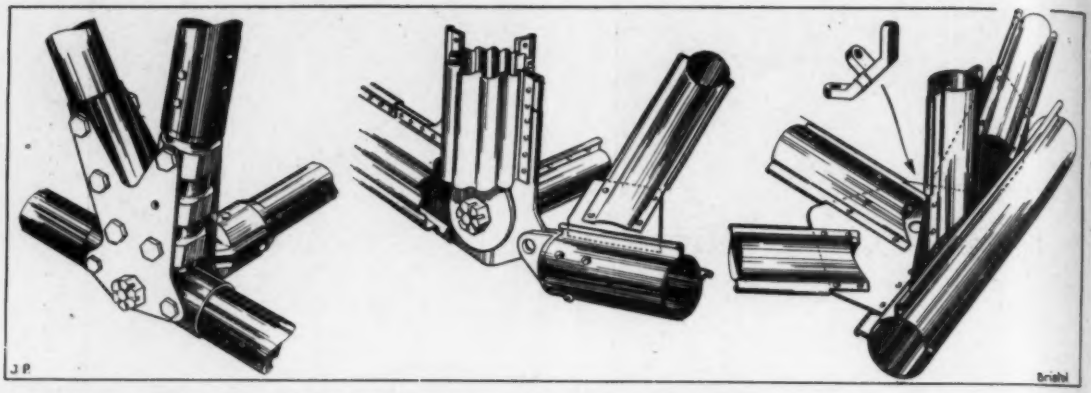
BOULTON & PAUL "SIDESTRAND" (2 Bristol "Jupiters").

BRISTOL "BULLDOG" (Bristol "Jupiter").

D.H. GIPSY MOTH (D.H. "Gipsy"). ("FLIGHT" *Photo.*)

D.H. COUPE MOTH (D.H. "Gipsy"). ("FLIGHT" *Photo.*)

AT OLYMPIA



FUSELAGE DETAILS OF THE BRISTOL TYPE 110A PASSENGER AIRCRAFT: On the left a joint in the front portion, where solid steel tubes are used. In the centre portion "crinkled" strip tubes are used, while in the rear portion strip construction, with a minimum of riveting, is adopted.
("FLIGHT" *Sketches.*)

Large fixed "Triplex" windows are fitted along both sides of the saloon, and ventilation is by six ventilators in the top sides, adjustable from within. An air extractor is provided at the rear of the saloon. The colour scheme is blue, a blue cloth covering extending up to the windows, and the seats and carpet being royal blue. For the peace of mind of the passengers an airspeed indicator, height recorder and a clock are fitted in the forward part of the saloon, in full view of the passengers.

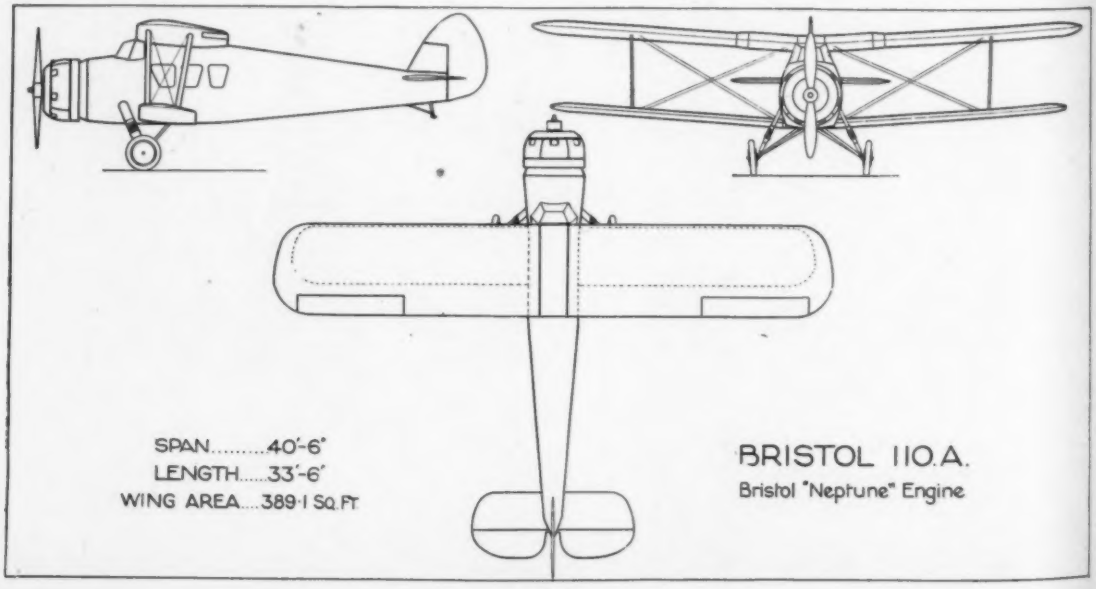
Structurally the Bristol 110A is an all-metal, and chiefly all-steel, machine in which use is made of the now well-known "Bristol" methods of construction. The fuselage, is composed of several sections bolted together. First there is the engine plate support, which is in the form of four tubular struts braced by tie rods, and forming a complete unit bolted at the corners to the fuselage proper. Then comes the pilot's cockpit, which is also a complete unit, of tubular construction, and having tie rod bracing in the bottom panels and a Warren girder in the side panels. The saloon portion of the fuselage has members built up of high-tensile steel strip, the struts being of a peculiar corrugated or "crinkled" section, as shown in a sketch. The rear portion of the fuselage is of typical "Bristol" steel strip construction. Finally the extreme stern portion is composed of the stern post, four longerons and a pair of diagonal side panel struts, all of nickel chrome steel.

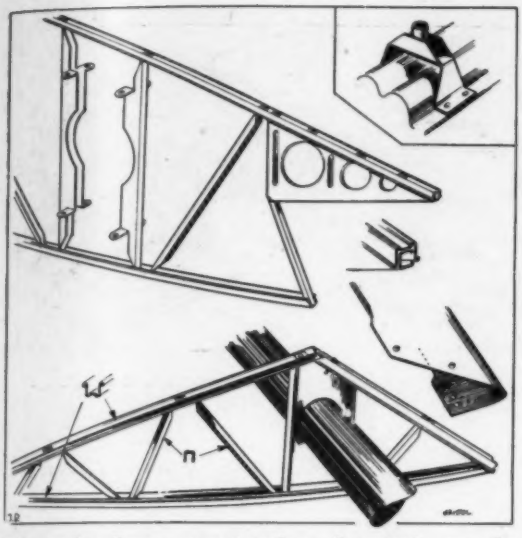
The biplane wings are of the familiar "Bristol" construction, with box spars of corrugated steel strip, and ribs of the same material. The internal drag struts are steel tubes with tie-rod drag bracing. The leading edges are of sheet aluminium, and the trailing edges of steel tubing. All wing fittings are steel stampings, and are placed well inside the wing covering.

Ailerons are fitted to the top planes only, and are of familiar Bristol-Frise type, with grease-gun lubrication. The inter-plane struts are built up of nickel-chrome steel strip, with steel fairings. The bracing wires are high tensile steel streamline wires, cadmium plated.

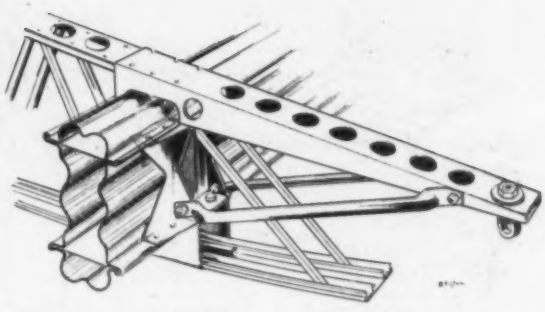
An undercarriage of the "split" type is fitted, rubber compression blocks being used in conjunction with oleo damping gear. The rubber blocks are of long oval section, and form in themselves part of the fairing. The members of the undercarriage are all faired with Balsa wood and aluminium. The undercarriage telescopic legs have a stroke of no less than 8 in., so that the undercarriage is well able to withstand severe shocks on landing, not to mention taxying over rough ground.

The petrol system is of the direct-gravity feed type, with two tanks of 45 gallons' capacity each, carried in the top wings, close in to the body. Each tank has a petrol gauge, so mounted that it is visible from the cockpit, and the outlet sumps have petrol cocks controlled from the cockpit. The petrol pipes are solid drawn copper, with all-metal joints, and a filter is mounted on the forward side of the fireproof





Rib and aileron construction, in steel, on the Bristol 110A passenger machine.



The bearings of the " Frise " ailerons are supported, in the 110A, on specially reinforced extensions of the main ribs. (" FLIGHT " *Sketch.*)

bulkhead. From the filter to the carburettor the fuel is carried by " Petroflex " tubing. The oil tank, of 9 gallons capacity, is carried in the forward end of the fuselage, on rubber blocks. An oil cooler is carried on the bottom of the fuselage and fitted with a valve to provide automatic variation of the cooling.

As previously mentioned, either the " Neptune " or the " Titan " engine can be fitted. An " Eclipse " inertia hand starter is provided in either case as standard equipment. If desired, an " Eclipse " electric starter can be fitted instead, at extra cost.

When fitted with the " Neptune " engine, the gross weight of the Bristol 110A is 4,260 lbs., and when the " Titan " is used, the gross weight is 3,720 lbs. In the former case, the estimated top speed is 125 m.p.h., and in the latter, 111 m.p.h. The respective cruising speeds are 100 and 90 m.p.h., and the landing speeds 56 and 52 m.p.h. The duration, in each case, is 6·2 hrs. at normal cruising speed (ranges 620 and 560 miles, respectively), and the time to climb to 5,000 ft., 11 and 16½ mins., respectively.

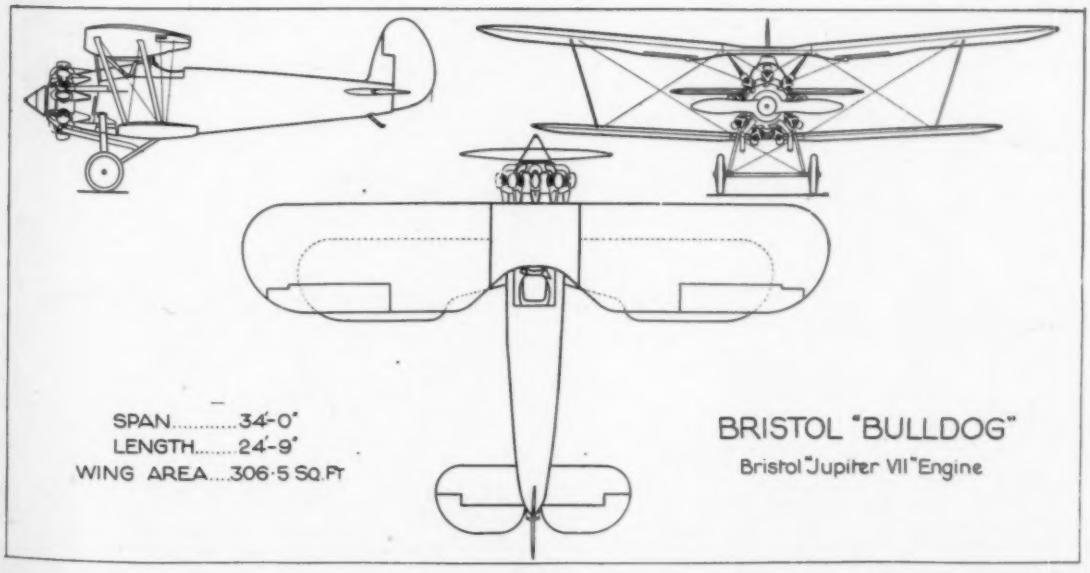
The second machine to be exhibited on the " Bristol " stand will be one of the " Bulldog " single-seater fighters of which a few months ago several were ordered for use by Royal Air Force squadrons, after very exhaustive and searching tests. The machine has now also been ordered by other countries. The " Bulldog " can be fitted with the Bristol " Jupiter " series VII, supercharged engine, when high speed at great altitudes is desired, or with the series VIA " Jupiter " when the machine is not expected to operate much above some 15,000 ft. The pilot's view is good in all directions ; this has been achieved by cutting away the trailing edges of upper and lower wings near the centre-section and body, respectively. The centre-section itself is of thin section, so as to interfere as little as possible with the view.

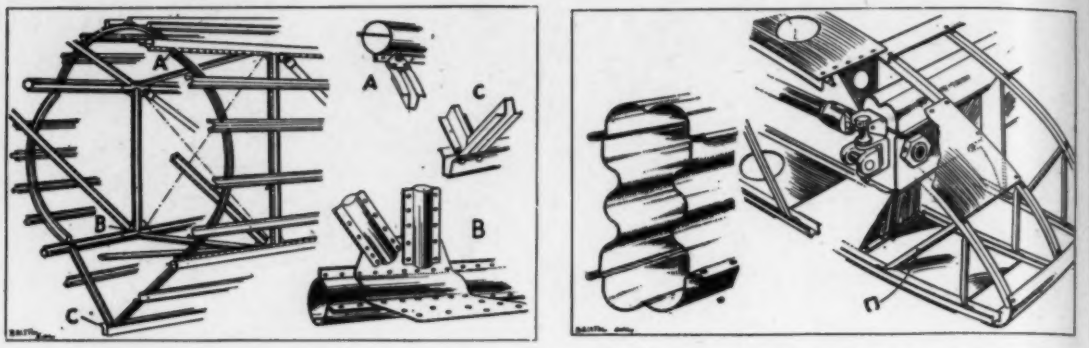
The " Bulldog " is an all-metal machine, built almost entirely of high-tensile strip steel. In the fuselage, two distinct forms of construction are to be found : tubular in front and the special " Bristol " strip steel construction at the back. As this has been very fully described and explained in FLIGHT, by Mr. Pollard, there is little need to go into great detail here.

The wings are also of steel strip construction, and details of spars, ribs, etc., have, in this case, also been given in FLIGHT, by Mr. Pollard. As our space is limited, it will be preferable to devote it to the general features of the " Bulldog."

The pilot's seat is of the bucket type, designed to accommodate a parachute. Its height is adjustable in flight over a range of 4½ ins. The pilot's harness is so arranged that it can be locked in any desired fore and aft position over a range of 7 ins. The pilot's windscreen, it will be observed, is of unsymmetrical shape in order to give complete protection from slipstream draught.

The equipment includes two Vickers' machine guns,





SOME BRISTOL "BULLDOG" DETAILS: On the left the fuselage construction. On the right, a main spar (steel) and other wing details. ("FLIGHT" *Sketches.*)

mounted one on each side, in gun tunnels and readily accessible from the seat, a wireless apparatus and an oxygen installation. The bottle of the latter is held in a quick-release cradle, and can be withdrawn through one of the side doors.

The gross weight of the "Bulldog" is 3,250 lbs., of which 1,153 lbs. is load, comprising pilot, military load, fuel and oil. The total-fuel capacity (in tanks in the top planes) is 70 gallons, and the oil capacity, 3 gallons. The military load comprises two Vickers' guns, 1,200 rounds of ammunition, parachute, C.C. gear, gun sights, oxygen apparatus, electrical equipment, instruments, wireless, signal pistol, and fire extinguishers.

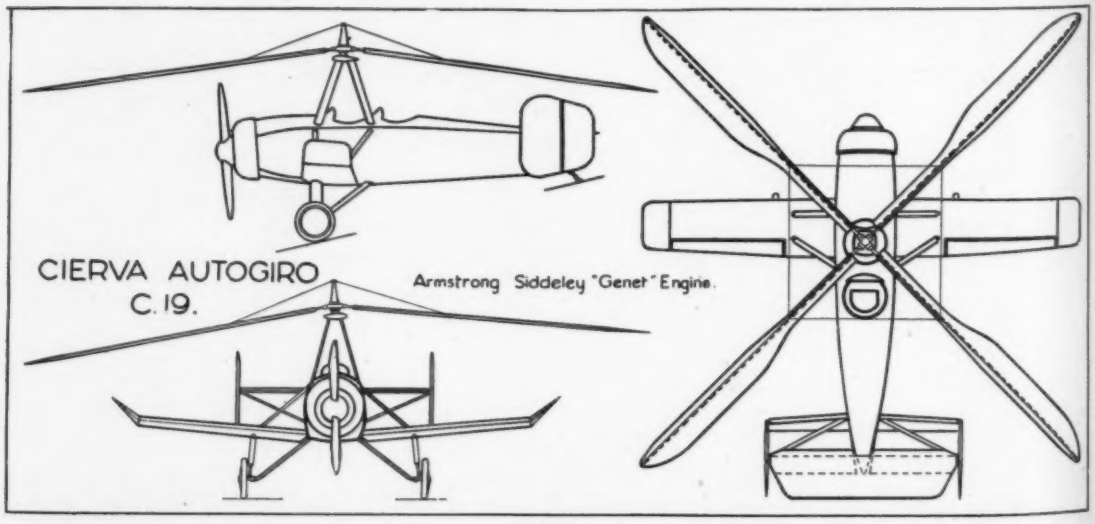
When fully loaded, the "Bulldog" climbs to 20,000 ft. in 13 mins., and the speed at that height is 165 m.p.h. A normal cruising speed of 130 m.p.h. can be maintained without in any way overrunning the engine. A well-known test pilot who has flown it, reports that the rigidity of the metal structure is such that when diving the "Bulldog" at a maximum speed of 270 m.p.h. the machine is just as steady as it is when cruising at 130 m.p.h., with no tendency to flutter.

THE CIERVA AUTOGIRO CO., LTD.

THE most unorthodox aircraft to be seen at Olympia will be the Cierva "Autogiro" or "windmill" 'plane, in which lift is obtained not from rigid stationary wings as in the normal aeroplane, but by four windmill or airscrew blades which, by their rotation, exert lift and carry the machine. The visitor to this stand should be careful not to confuse the "Autogiro" with the helicopter type of aircraft. In the latter, the rotating wings are driven by the engine, while in the "Autogiro" the four blades are free to rotate around a nearly vertical shaft, their rotation being entirely due to the air forces upon them, and not to any direct drive from the engine.

The particular machine to be exhibited at Olympia will be a type C. 19, with Armstrong-Siddeley "Genet" engine, designed as a private owner's two-seater light 'plane. The machine is a development of the "Autogiro" C. 8 Mark II (Armstrong-Siddeley "Lynx"), which successfully completed 3,000 miles without any major replacements during a tour of Britain in August, 1928, a flight from Croydon to Paris in September, of 1928, and a tour of 1,500 miles from Paris to Berlin, *via* Brussels, Cologne, Dortmund, Hanover and Dessau, and return to Paris *via* Magdeburg, Hanover, Munster, Rotterdam and Brussels in October, 1928.

The fuselage of the "Autogiro" C.19 is of welded steel tube construction, and is supported on a split undercarriage of very wide track and incorporating oleo legs with a stroke



of 12 in., which should give excellent shock-absorbing qualities. Bendix brakes and wheels are fitted, and as the "Autogiro" alights with very low forward speed, the brakes should reduce the landing run to a few feet. Thus it should be possible to land the "Autogiro" in almost any field.

The mast which supports the rotating wings is in the form of a pyramid of steel tubes with conical platform, welded and riveted. The hub of the rotor is a steel forging incorporating radial and thrust ball bearings, and a system of braking. The wings themselves are of the mono-spar type, with spars of steel tube and box ribs. The covering is a planking of mahogany. The stabilising planes are of mixed construction, with front and rear spars of box section in wood, while the aileron spars are steel tubes.

A biplane tail is fitted, composed of top and bottom tail plane, of which the top plane acts as the elevator while the bottom plane is fixed, and two rudders and fins. The construction of the tail is in steel-welded tube.

The equipment and instruments fitted as standard are :— 2 air-speed indicators, 2 cross levels, 2 safety belts, 1 altimeter, 1 engine revolution counter, 1 rotor revolution counter, 1 oil thermometer and one tele-level.

A standard fuel capacity of 23 gallons is provided, which gives the machine a cruising range of 280 miles at a speed of 80 m.p.h.

The main dimensions, areas, etc., of the "Autogiro" C. 19 are :—Length, o.a., 30 ft.; span, 30 ft.; height, 10 ft.; rotor chord, 1 ft. 3½ in.; total rotor area, 25·74 sq. ft.; stabilising plan echord (average), 2 ft. 6½ in.; total stabilising plane area, 42 sq. ft.

With a tare weight of 750 lbs., and a disposable load of 550 lbs., the "Autogiro" C. 19 has a gross weight of 1,300 lbs., which gives a rotor loading of 45·5 lbs./sq. ft. and a stabilising plane loading of 3·1 lb./sq. ft.

A top speed of 95 m.p.h. is claimed, and a cruising speed of 80 m.p.h. The initial rate of climb is 500 ft./min., and the landing speed 10 m.p.h. In still air the take-off run is 30 yards, and the landing run 10 yards.

DE HAVILLAND AIRCRAFT CO., LTD.

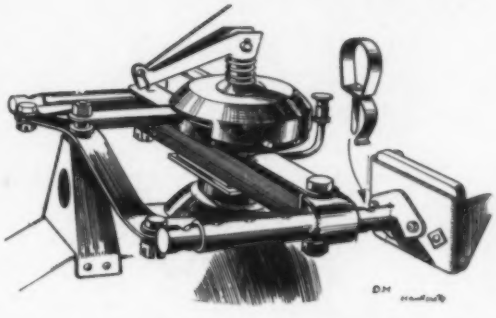
FOUR complete machines will be exhibited on this stand, *i.e.*, the D.H. "Hawk Moth" with "Lynx" engine, a standard "Gipsy Moth" land 'plane of the open type, a "Gipsy Moth" coupé, and a "Gipsy Moth" seaplane.

The D.H. "Hawk Moth," which is the latest production of the De Havilland Aircraft Co., was the first British saloon machine to be produced, and has been designed to meet the needs of the private owner who requires a machine of rather larger carrying capacity than the two-seater light 'plane type, for "feeder line" work and for air taxi work.

The "Hawk Moth" is of composite construction, with a fuselage of welded steel tube and a wing structure of wood. The comfort of the passengers has been studied to a large degree and the saloon is roomy and remarkably free from noise and vibration. Normally the machine is intended to carry four occupants, *i.e.*, pilot and three passengers, while there is ample room for luggage in the rear of the cabin. The passengers are seated in pairs side by side, the pilot occupying the left-hand front seat. Opposite the other front seat provision is made for fitting a detachable dual control unit. All the seats are fitted with air cushions and are remarkably comfortable. Owing to the high position of the wing and the fitting of windows all along the sides of the saloon, as well as the front windscreen, the view from the machine is excellent for passengers as well as pilot.

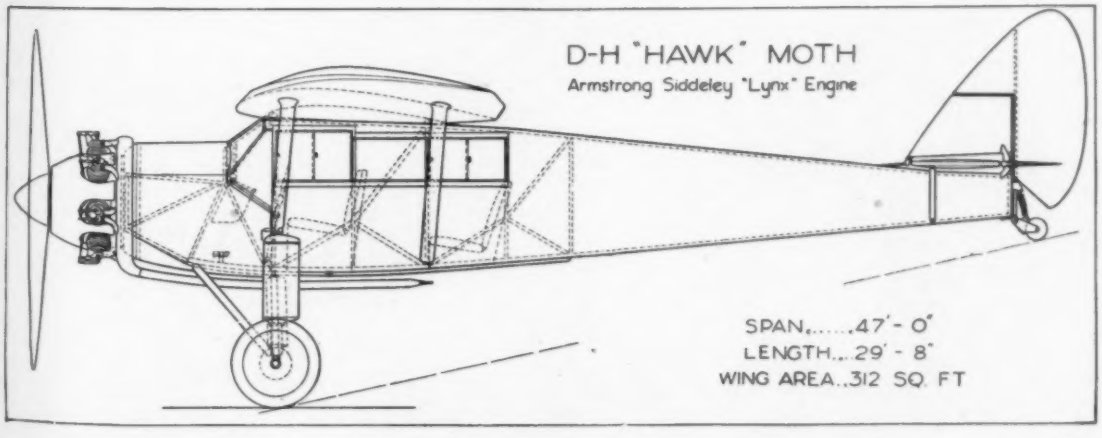
A polished dashboard is fitted in front of the forward seats, and is so arranged that it can be swung down on hinges for inspection of the instrument joints at the back of the dashboard. Below the dashboard is a convenient locker for maps, gloves, parcels and small personal gear.

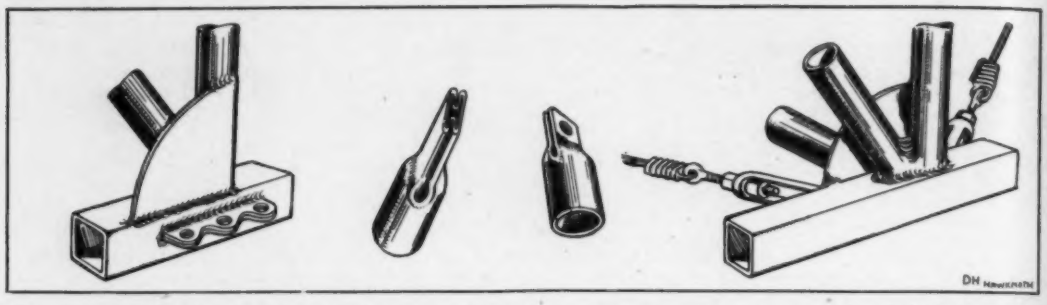
The undercarriage is of exceptionally wide track, which, combined with wheel brakes, gives particularly good manœuvrability on the ground even in the strongest of winds. The wheel brakes are operated by the rudder bar when taxying, but when landing both brakes may be applied simultaneously by means of a hand lever.



Rudder pedals and other control details on the De Havilland "Hawk Moth." ("FLIGHT" *Sketch.*)

At Olympia the "Hawk Moth" will be equipped with a 240 h.p. Armstrong Siddeley geared "Lynx" engine, and the performance figures, etc., quoted below, refer to the machine so fitted. The petrol is contained in two tanks housed in the wings, one on each side, each of a capacity of approximately 35 gallons. Supply to the engine is by direct gravity feed, and the quantity of petrol carried suffices for a range of approximately 625 miles at cruising speed.

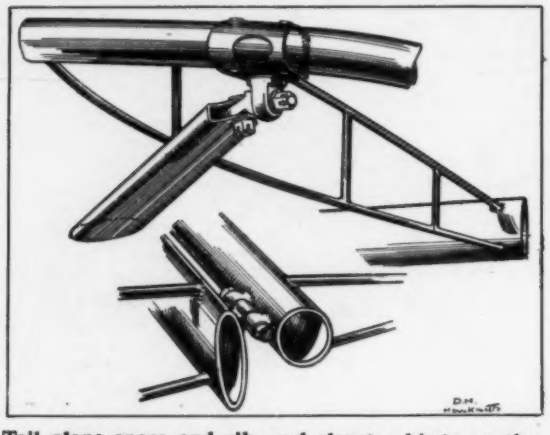




WELDED STEEL TUBE CONSTRUCTION IS EMPLOYED IN THE DE HAVILLAND "HAWK MOTH": Sketches showing welded joints, pinched strut ends, &c. ("FLIGHT" *Sketches.*)

The main dimensions of the "Hawk Moth" are as follows: Length overall, 29 ft. 1 in.; span, 47 ft.; wing area, 304 sq. ft.; width with wings folded, 14 ft. 6 in.; height, 9 ft. 6 in.

The normal gross weight of the "Hawk Moth" is 3,500 lbs.



Tail plane spars and rib, and elevator hinge on the "Hawk Moth." ("FLIGHT" *Sketches.*)

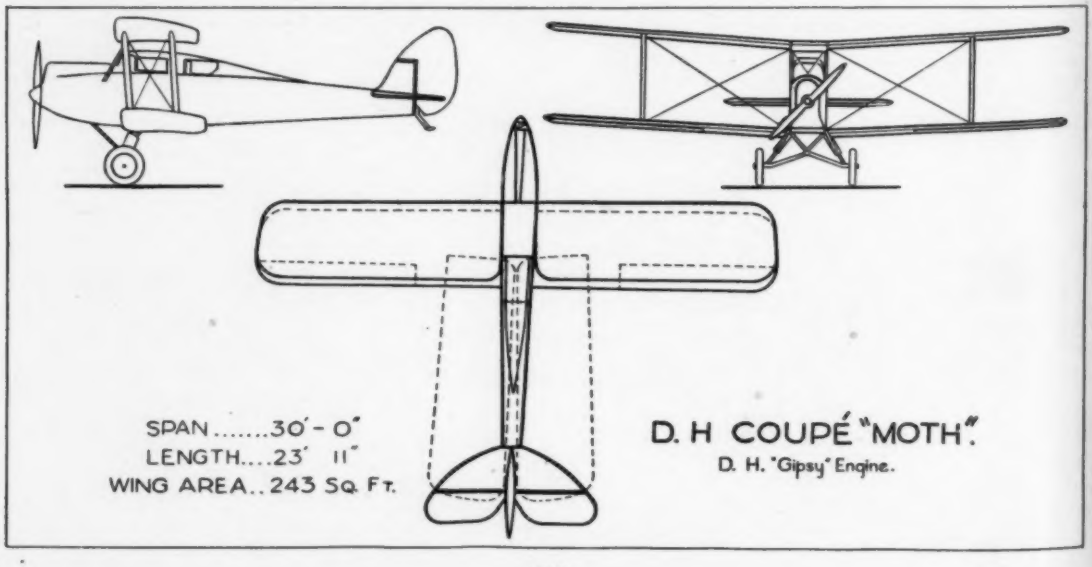
and the pay-load, not including pilot or fuel, is 525 lbs. The machine may, however, be loaded up to 3,800 lbs. within its certificate of airworthiness. In that case the pay-load may be increased to 825 lbs. with the normal tankage, or, if less range is required, the pay-load may be correspondingly increased.

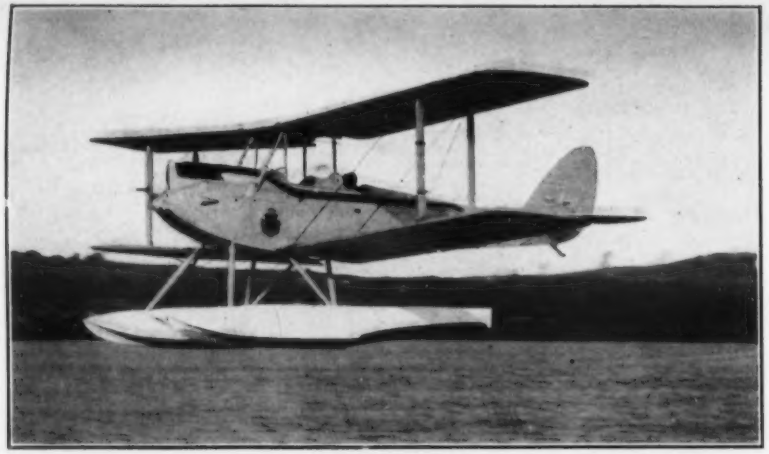
The following performance figures refer to a gross weight of 3,300 lbs.: top speed at 1,000 ft., 124 m.p.h.; rate of climb at ground level 770 ft. per minute, service ceiling 14,500 ft., stalling speed 53 m.p.h.

Of the three "Gipsy Moths" to be exhibited one, the coupé "Moth," will be of the earlier form of De Havilland construction with plywood covered fuselage, and wooden wings. The other two "Gipsy Moths" will be of mixed construction in that they will have the latest type of D.H. welded steel tube fuselage and wooden wings.

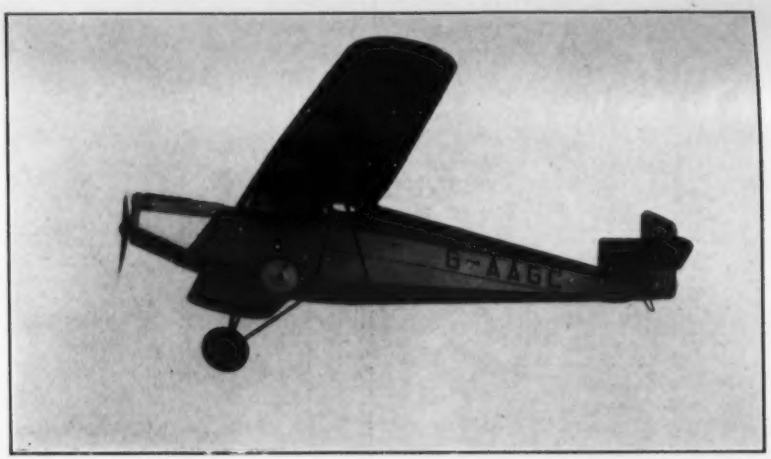
The De Havilland type of wood fuselage is already well known, and it will therefore suffice if we confine ourselves merely to recalling that it consists of light spruce longerons and struts covered with plywood. This type of construction has amply proved itself in actual service over several years and has been found to be both strong and rigid and to require no rigging after leaving the factory. Beyond periodic cleaning the "Moth" type fuselage requires practically no maintenance work. Another advantage of the semi-monocoque construction is that repairs can easily be carried out anywhere and almost by anyone.

The wooden wings of the De Havilland "Gipsy Moth" are of normal type with spindled I-section spruce spars, spruce interplane struts, and internal drag struts in the form of steel tubes. The wings of all types of "Moth" are, designed to fold back against the fuselage, enabling the machine to be wheeled through a 10 ft. doorway and housed in a garage of normal dimensions. The folding gear is of the simplest type, it being necessary merely to swing the two jury struts into their sockets, withdraw four spring loaded locking bolts, and fold the wings back, locking them in position with special catches. The operation occupies only a few seconds. With wings folded a "Moth" can easily be towed along any reasonably wide road behind a light car.

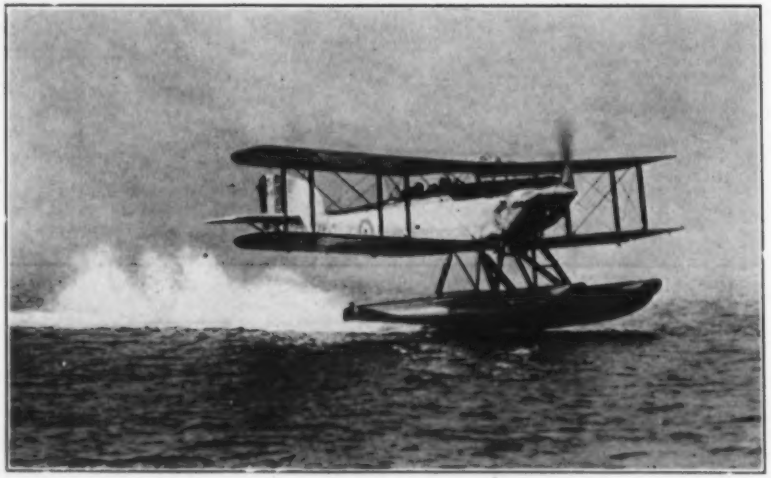




D.H. GIPSY-MOTH SEAPLANE ("Gipsy"). ("FLIGHT" *Photo.*)



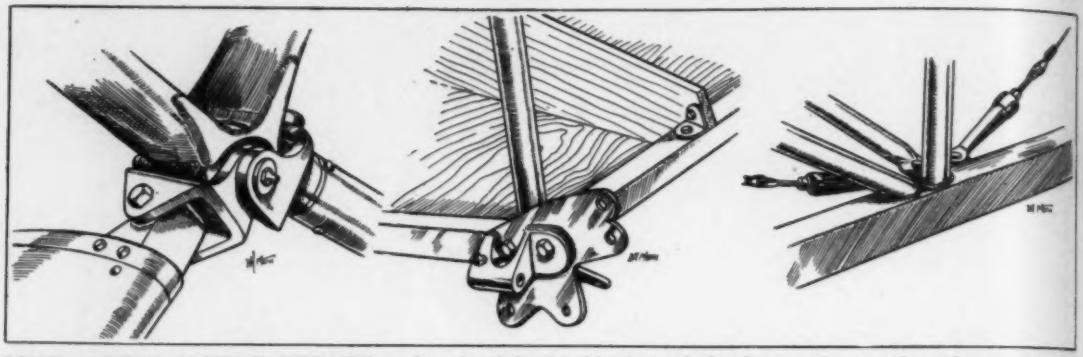
DESOUTTER SPORTS COUPE ("Cirrus III"). ("FLIGHT" *Photo.*)



FAIREY III F SEAPLANE (Napier "Lion").

FAIREY III F GENERAL PURPOSE (A.S. "Jaguar").

AT OLYMPIA



SOME "GIPSY MOTH" DETAILS: On the left the hinging of the bent axles to the cabane. In the centre a wing root and undercarriage fitting, and on the right a welded steel tube fuselage joint.

The metal fuselages of the two open "Gipsy Moths" make use of steel tubing, chiefly of square section. In the front portion, from the fireproof bulkhead to the pilot's cockpit, struts as well as longerons are of square section, and the joints between them are made by fishplates and bolts. In the rear portion of the fuselage a slightly different form of construction is employed. Here, as in the front part, the longerons are of square section, but the struts in the side bays are of round section and joined to top and bottom longerons by welding. Throughout the fuselage diagonal struts are employed for the bracing, forming Warren or N girders without bracing wires. In the "Moth" metal fuselages the covering is fabric, which is carried on light fore and aft stringers. With these general remarks on the form of construction employed in the various types of "Moths," we may turn to the general features of the three machines to be exhibited.

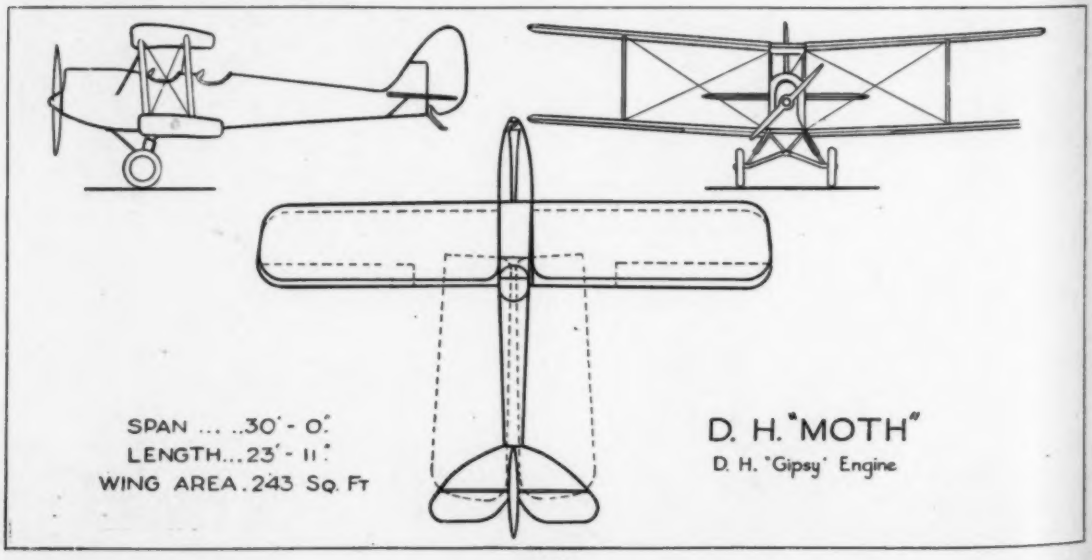
The "Gipsy Moth" open land 'plane is a two-seater biplane designed for use as a training machine and for club and school work, as well as for private ownership. The cockpits are roomy and very comfortable, and large windscreens ensure the exclusion of draught from the cockpits. In the pilot's cockpit a dashboard with black cellulose finish carries air speed indicator, altimeter, tachometer, oil pressure gauge, inclinometer, and, if required, a watch and holder. A de Havilland Patent airspeed indicator on the starboard strut is also a standard fitting. If desired, the Hughes Mark III aperiodic compass can be fitted in front of the control lever. Above the instrument board is a small shelf to take maps, gloves and other small articles, while map cases are fitted within easy reach of the left hand. Behind the pilot's cockpit there is a large luggage locker in which suitcases can be stowed. Speaking tubes, of a new light type, including mouth and earpieces, can be fitted.

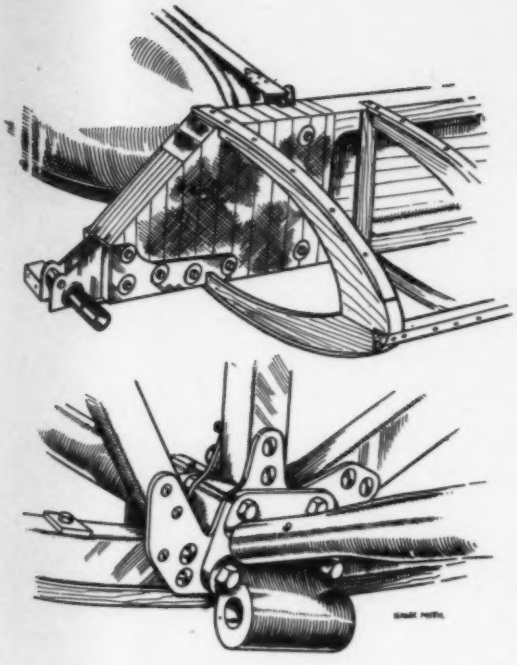
The controls of all "Moths" are very light to operate, and the machine responds immediately to the smallest touch. A spring-loaded elevator permits of trimming the machine to fly "hands off" at all speeds and throttle openings, and an adjustable spring on the rudder bar counteracts propeller torque. The ailerons are operated by the well-known de Havilland differential ailerons, which, in addition to reducing the load on the stick, minimise yawing due to lateral control. Ball races are employed throughout in the controls, and all pulleys have been eliminated and replaced by levers. No cable touches any part of the structure throughout its length, and the chance of a cable fraying is, therefore, reduced to a minimum. The rudder bars are fitted with adjustable pedals to suit pilots of different heights. Dual controls are fitted, but the forward control stick can be removed in a few seconds.

The de Havilland "Gipsy" engine is neatly faired in in the nose of the fuselage, and is mounted direct on bearers on the fuselage sides. All accessories such as filters, magnetos, carburettor, etc., are readily accessible by opening the quickly-detachable cowling. The starting of the engine—one magneto of which is fitted with an impulse starter—usually follows a single swing of the propeller, and it is not, therefore, considered necessary to fit the cockpit hand starter with which the original "Moths" were equipped.

The "Gipsy-Moth" petrol system is very simple and provides for direct gravity feed from tank to carburettor. The petrol tank is of streamline form and carried in the top wing centre section. It has a capacity of 19 gallons, which gives the machine a range of 4½ to 5 hours at cruising speed. A simple float-operated petrol gauge is fitted above the tank in a position in easy view of the pilot.

The land undercarriage of the "Gipsy-Moth" differs from that of the older models in that it is of the split axle type,





A wing root and fuselage fitting on the " Hawk-Moth." (FLIGHT " *Sketches.*)

with wider track and increased ground clearance. The landing shock is absorbed by a rubber block unit in the undercarriage legs, the compression rubbers being in series. the natural hysteresis of the rubber, combined with the friction obtained from the " Ferrodo " lined pistons sliding in the outer casing. provides sufficient damping.

The main dimensions of the standard " Gipsy-Moth " are : Length o.a., 23 ft. 11 ins. ; wing span, 30 ft. ; width with wings folded, 9 ft. 10 in. The tare weight is 962 lbs., and the load carried may be made up normally as follows : Two occupants, 320 lbs. ; 19 gallons of petrol 140 lbs. ; 2 gallons of oil, 19 lbs. ; luggage to make up maximum gross weight 309 lbs. Gross weight for normal Certificate of Airworthiness 1,750 lbs. For the " Aerobatics " C. of A. the maximum permissible gross weight is 1,550 lbs.

Normally, nothing like 300 lbs. of luggage will be carried, and a fair average gross weight to take is 1,350 lbs. At this weight the performance of the " Gipsy-Moth " is as follows : Maximum speed near ground 103–105 m.p.h. Full speed at 5,000 ft., 100 m.p.h. ; cruising speed at 1,000 ft., 85–90 m.p.h. ; stalling speed, 40 m.p.h. ; length of run to take off, 80 yards ; landing run, 100–120 yards ; rate of climb from ground, 700 ft.-mins. ; time to 5,000 ft., 9 mins. ; time to 10,000 ft., 21 mins. ; absolute ceiling, 18,000 ft. ; cruising at 80 m.p.h., the petrol consumption is approximately 4¼ gallons per hour, which gives a working range of about 320 miles.

The Coupé " Gipsy-Moth " has been designed and introduced for those who prefer the protection against draught which the coupé arrangement offers. Already the coupé machine is becoming popular, and as it provides very nearly the comfort of a limousine at but small extra cost compared with the standard open type of machine, it is likely to become increasingly popu'ar in the future.

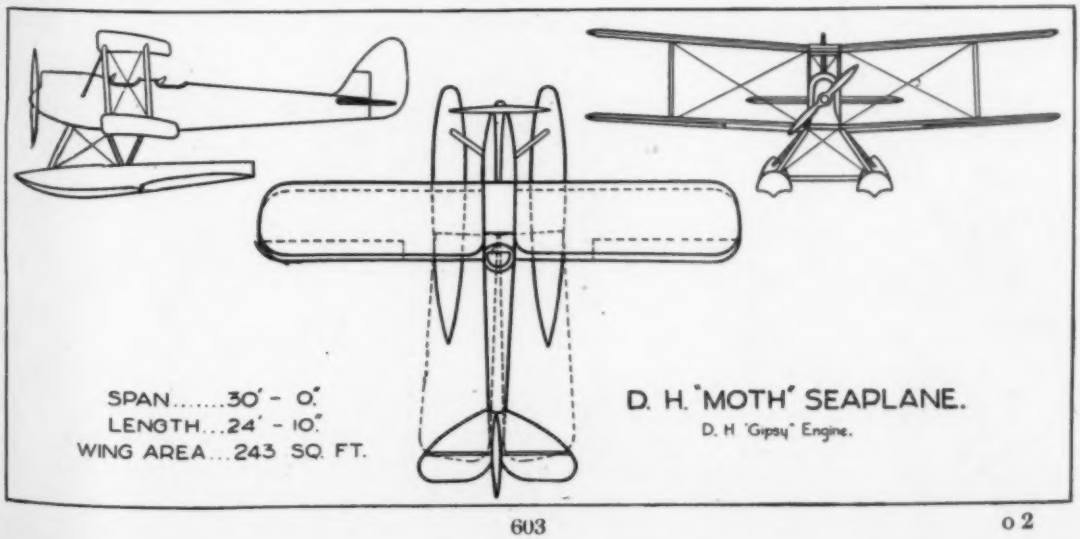
The coupé addition takes the form of a roof and clear celluloid windows attached to the top of the ordinary " Moth " deck fairing. The view of both occupants is as good as in the open machine, with the exception of straight to the rear, and in addition to keeping out all draughts, the coupé considerably reduces the amount of engine noise which reaches the occupants.

Wearing of special flying clothes is unnecessary in this Coupé " Moth." If the occupants desire to use the inter-cockpit telephones, the earpieces of which are attached to flying helmets, the helmets may be worn, but other special kit is unnecessary. If desired, the coupé top can be supplied as a separate unit for permanent attachment to a standard " Moth."

The dimensions and performance of the coupé " Moth " are exactly the same as the corresponding figures for the open " Moth." The tare weight is, however, 925 lbs. in the case of the wood fuselage machine. The gross weights for normal and " Aerobatics " C. of A. are identical with those of the open type.

The " Gipsy-Moth " seaplane is, except for its undercarriage, identical with the land 'plane, with wooden wings and steel tube fuselage. Consequently the description given above of the land 'plane will cover the seaplane also, except for the details of the undercarriage. The " Gipsy-Moth " seaplane is equipped with two Duralumin single-step floats, specially constructed for it by Short Brothers, of Rochester. These floats, although remarkably light, are naturally a little heavier than the wheels of the land machine, and consequently the seaplane version has a slightly greater tare weight. It speaks well for the aerodynamic design of these floats, however, that in spite of the extra weight, the performance of the seaplane is but very slightly inferior to that of the land 'plane.

When running on the water, the Short floats of the " Gipsy-Moth " throw up remarkably little spray, even at speeds just below the planing speed, and altogether the " Gipsy-



Moth " seaplane is remarkably " clean " on the water. No water rudders are fitted to the floats, but in spite of this the machine can be manœuvred quite well with the air rudder while the engine is running.

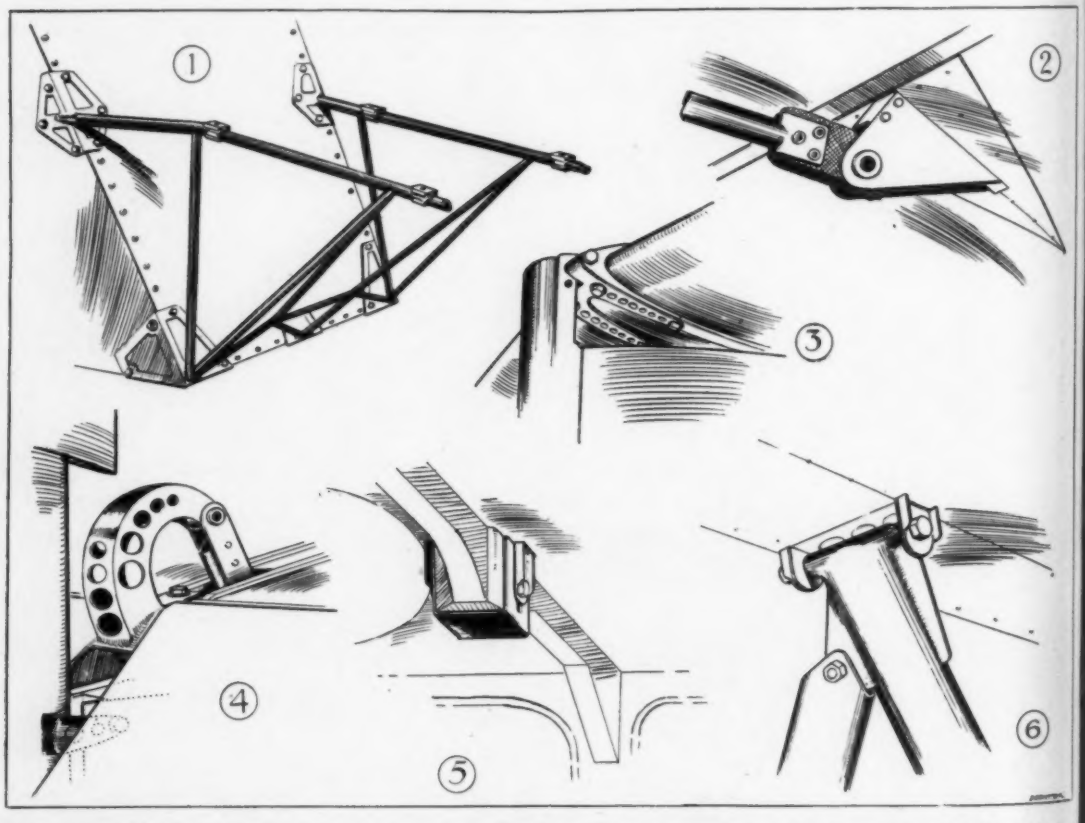
The tare weight of the " Gipsy-Moth " seaplane is 1,070 lbs., and the permissible gross weights for the two classes of C. of A. are the same as for the land 'plane, *i.e.*, 1,750 lbs. for the " normal " and 1,550 lbs. for the " Aerobatics."

Following are the performance figures for the " Gipsy-Moth " seaplane :—Full speed at sea level, 98 m.p.h.; full speed at 5,000 ft., 92 m.p.h.; cruising speed at 1,000 ft., 75–80 m.p.h.; stalling speed, 43 m.p.h.; time to get off, 13–15 secs.; rate of climb from sea level, 480 ft.-min.; time to 5,000 ft., 14 mins.; time to 10,000 ft., 40 mins.; absolute ceiling, 13,000 ft. An amphibian undercarriage for a " Gipsy-Moth " is described under the exhibits of Short Brothers.

THE DESOUTTER AIRCRAFT COMPANY

MR. MARCEL DESOUTTER, the founder and sole owner of the Desoutter Aircraft Company, is by way of being one of the pioneers of British aviation, in that long before the war he was one of the famous band of pilots who, in those days, did their best to make Britain " Air-minded." As a result of an unfortunate accident, Mr. Desoutter lost one of his legs, and later, with his brother Charles, established a large business for the manufacture of artificial legs. Mr. Marcel Desoutter has now returned to aviation by forming his own company, and has chosen as a starting point, so to speak, the Koolhoven monoplane F.K.41, for which he has secured the world rights. At Olympia, the first of the British-built D.A.C. sports coupé monoplanes will be exhibited, and doubtless will attract considerable attention, not only because of the old-time connection of Mr. Desoutter with British aviation, but also on account of the many interesting features of the machine itself.

Fitted with a " Cirrus III " engine, the D.A.C. Sports Coupé is a three-seater monoplane admirably suited to the needs of the private owner pilot who wishes to be able to take two guests with him for a flight, or to the company which contemplates running air taxi services, or finally, to the operating company working " feeder lines " connecting up with main air trunk routes. To all these, the D.A.C. Sports Coupé should be of potential interest, in that it is a machine which is inexpensive in first cost, and the operation and maintenance cost of which should be low, bearing in mind the simple forms of construction employed and the, relatively, low power of the engine installed, which represents, when the machine is used for taxi or " feeder line " work, a power expenditure of but 40-45 h.p. per *paying* passenger. In spite of this, however, the performance is quite good, with a top speed of rather more than 100 m.p.h. The private owner-pilot, who desires, on occasion, to be able to take with him two friends, instead of one, will also find in this machine a mount which enables him to do so at very little greater cost than he has been accustomed to pay for a two-seater.



THE DESOUTTER MONOPLANE: Some constructional details. The tubular engine mounting is shown in 1. Note the rubber pads interposed between the engine bearers and the feet of the engine to reduce vibration. A flexible (rubber) connection is made between the aileron crank and its operating tube, as shown in 2. The tail plane adjustment is shown in 3, and the elevator crank in 4. Fig. 5 illustrates the fitting which locates the wing in relation to the fuselage, but which permits deflection of the wing spar. The attachment of lift strut to rear spar is shown in 6. (" FLIGHT " *Sketches.*)

THE FIRST SHOWING
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INTERNATIONAL AERO EXHIBITION
AT OLYMPIA

As a prominent example of American aircraft built solely for commercial work, the Ford tri-motored, all-metal transport monoplane offers much of interest.

It is designed to seat fourteen passengers in addition to crew of two and to give the general excellence of performance, stability and maneuverability needed in commercial flying — as contrasted with military requirements which accentuate one feature at the expense of others. Its high speed is 135 miles an hour; cruising speed 115 miles an hour; landing speed 60 miles an hour. Its service ceiling is eighteen thousand feet. Its weight light is 7600 lbs.; all up weight, 13,500 lbs. The disposable load is 5900 lbs. The radius of action, five to six hours.

The entire structure and covering of the Ford plane is metal, all exposed surfaces being "Alclad" alloy which is non-corroding. Aside from the obvious advantage of freedom from rotting, splitting, tearing, and warping, all-metal construction assures the perfect fit of all replacement parts, and its strength may be predetermined with accuracy.

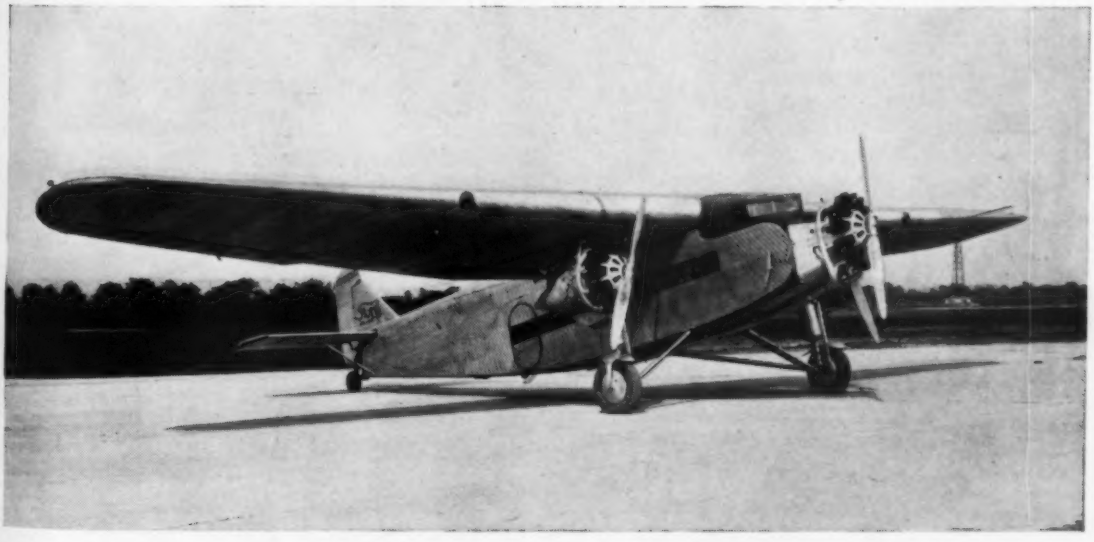
The power is provided by three Pratt & Whitney radial Wasp engines of 425 horse-power each. The Ford plane will fly and climb, with full load, on any two of its engines.

Independently operated hydraulic brakes on the wheels and the tail wheel instead of the skid provide motor-car control of the plane on the ground, and remove any need for a handling crew either while taxi-ing or testing the engines.

Ford planes are operating in regularly scheduled transport service over thousands of miles of airways in North, Central and South America. While accurate figures are not obtainable, we believe there are more Ford planes being used in the Western Hemisphere than all other tri-engined transports combined.

The price of the various models of Ford tri-motored transports, at Dearborn, Michigan, U.S.A., ranges from £8670 to £11,355.

FORD MOTOR COMPANY



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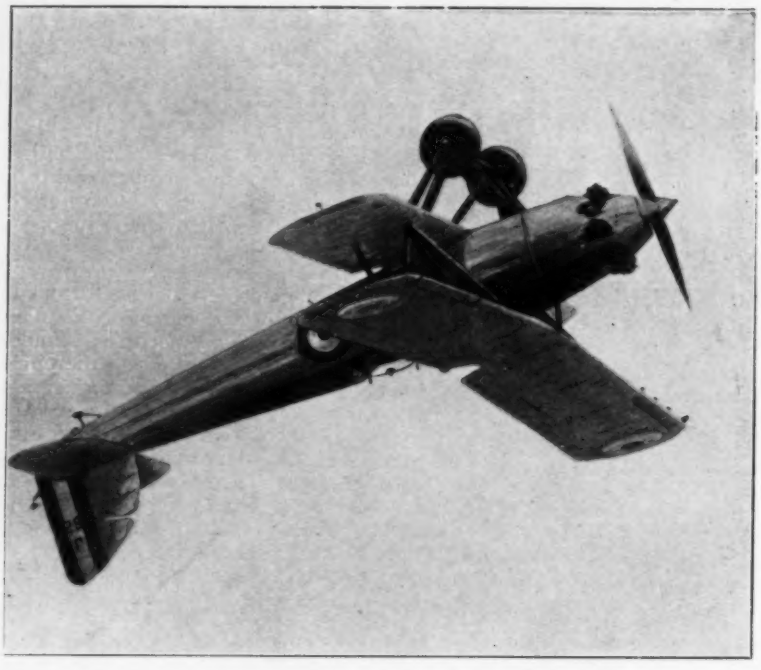

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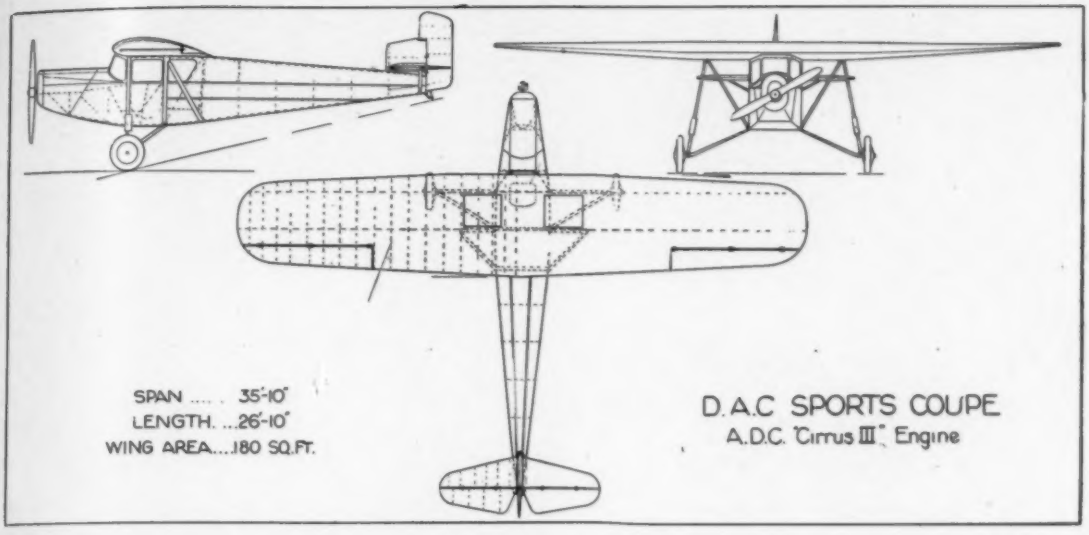
"Hydrophid, London."



Finally, the D.A.C. Sports Coupé offers the comforts of an enclosed saloon, avoiding the need for pilot or passengers wearing special flying clothes, while the low position of the fuselage over the ground makes the machine particularly easy to enter and leave, no steps being necessary.

The D.A.C. Sports Coupé is of all-wood construction, the fuselage being a semi-monocoque structure with a light internal framework covered with plywood. This type of fuselage has proved itself very light, durable and easy to maintain, while repairs can be made by almost any carpenter, should the need arise. In the centre, the fuselage is very deep, and extends, in fact, right up to the rear spar of the wing. Forward of the saloon, however, the depth is decreased so as to provide forward view through the large windscreen. Flutings formed in the deck fairing and in the engine cowling assist materially in enabling the pilot to look " past " the engine on either side, while side windows in the saloon provide lateral view for all three occupants.

The monoplane wing is an all-wood structure composed of two main box spars carrying former ribs, also of wood, the whole being covered with plywood. The wing is built in one piece, and if the internal structure of wing and fuselage is carefully examined it is found that the fuselage is, in fact, suspended mainly from points outboard on the wing, via the sloping lift struts. This rather clever arrangement, into the technical details of which we cannot go here, has the effect of reducing the stresses in the wing spars a good deal. The wing is located on the fuselage by a central fitting so designed as to allow the wing centre to deflect slightly under load, but preventing the wing to shift from side to side in relation to the fuselage.

The undercarriage is of exceptionally wide track, and should effectively prevent the machine from turning over on the ground, even in a very strong cross wind. The telescopic legs of the undercarriage are anchored at their upper ends to the wing spar at the points where the lift struts are attached.

The saloon has, as already mentioned, accommodation for three occupants. The pilot's seat is in front, just behind the windscreen, while the two passengers are placed behind him, in a deck-chair type of seat, which combines to a remarkable degree comfort and lightness. In the upper portion of the fuselage, just behind the saloon, is a luggage locker for suitcases, etc.

The main dimensions of the Desoutter Sports Coupé are : Length, 27 ft. ; wing span, 35 ft. ; wing area, 180 sq. ft. The tare weight of the machine is in the neighbourhood of 1,000 lbs., and the Certificate of Airworthiness covers a maximum gross weight of 1,650 lbs. The petrol capacity is 26 gallons, contained in two tanks of 13 gallons each, housed inside the wing, one on each side of the fuselage.

THE FAIREY AVIATION CO., LTD.

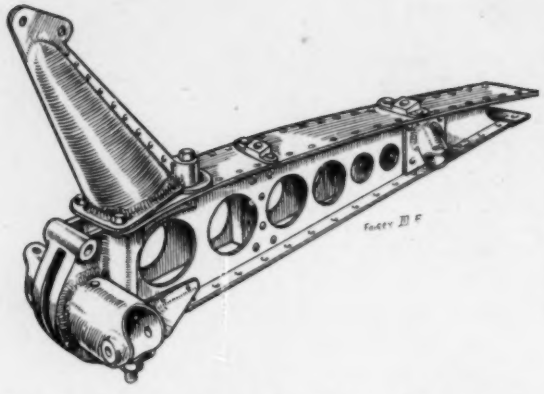
ONE of the most imposing individual exhibits at Olympia will be found on the Fairey stand, where no less than eight complete aircraft will be exhibited, in addition to smaller items such as airscrews, etc. These eight machines will be :—

- One Fairey III F, Napier " Lion XI," to be shown in skeleton.
- One III F 3-seater (" Lion XI ") Fleet Air Arm Seaplane.
- One III F 2-seater (" Jaguar VI ") General Purpose landplane.
- One " Fox " 2-seater (Rolls-Royce F) high-performance light day bomber.
- One Long-Distance Monoplane (Napier " Lion ").
- One " Firefly II " (Rolls-Royce F) single-seater interception fighter.
- One single-seater fighter Ship 'plane with alternative land undercarriage (Rolls-Royce F).
- One Fairey two-seater Fleet fighter reconnaissance seaplane (Rolls-Royce F).

The Fairey III F to be shown in skeleton will afford a very excellent opportunity for visitors to Olympia to inspect in detail the Fairey forms of all-metal construction. This was in fact, the machine from which we obtained most of the sketches which illustrate this article, and as the III F is largely typical of other Fairey machines shown, with certain detail variations, it will also be used here as a basis for a brief description of Fairey metal construction in general, bearing in mind the fact that the construction to be described is only broadly similar in some of the other types and not absolutely identical.

Mr. C. R. Fairey was one of the first British constructors to adopt welded steel tube fuselage construction, and as a result of very extensive experiments on a very large number of joints, he became convinced of the mechanical soundness of welding if properly carried out. Gradually a system has been evolved at Hayes which has been found not only rapid and cheap in production, but also to stand up well to its work under actual service conditions. It should be realised that at the present time there is probably something like 200 Fairey III F machines in service in various parts of the world, and if the special Fairey form of welded construction had been at all likely to develop any fault, it stands to reason that this would have been discovered long ago. Consequently one may justifiably assume the Fairey form of welded steel tube fuselage construction to be thoroughly reliable.

In this connection it should be pointed out that Fairey

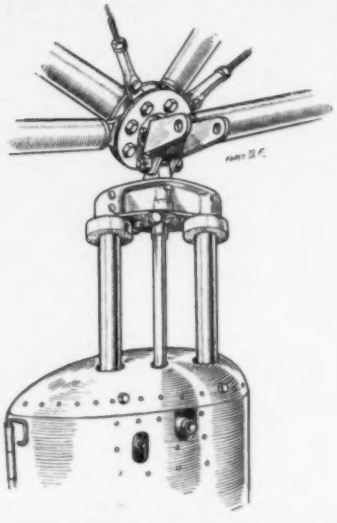


Aileron crank and rib on the Fairey III F. (FLIGHT *Sketch.*)

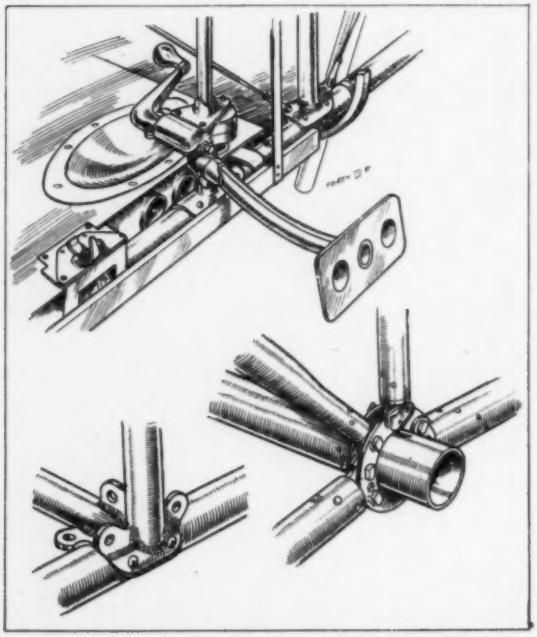
does not, like Fokker for example, employ welded construction *throughout*. For instance, the front portion of the fuselage has longerons and struts with end fittings in the form of plugs pinned into the tubes, the plugs being formed with either plain eye bolt ends or with fork ends. These end fittings in turn are bolted to steel "spools," which also carry the anchorages for any bracing wires, etc. It may be recalled that even in the days before all-metal construction the Fairey Aviation Co. made use of these "spools" at certain points such as where lower wings, top centre-section struts and undercarriage struts were attached. The "spools" have been retained after the rest of the structure became all-metal.

Forward of the backbone or central cellule formed by the bolted tubes is attached the engine bearer, itself a welded steel tube structure. The joints between the engine bearer and fuselage proper are made on "spools." Aft of the central cellule, also joined by "spools," the fuselage structure makes use of the Fairey form of welded construction. The longerons in this portion run through from rear spool to sternpost. The struts in the sides and those in top and bottom bays, instead of being individually attached, as is more usualy done, are made up into the form of a panel or frame, the strut ends being welded to plates which, when in place on the machine, rather more than half surround the longerons, to which the plates are riveted, thereby locating the panel on the longerons. It will be seen that with the Fairey form of welded construction, the longerons themselves are not affected at all by the welding process, and this may have something to do with the good results obtained.

The Fairey all-metal wing construction differs slightly according to the type of machine, but in the case of the III F's of all types, and some of the other types, the main wing spars are steel tubes which were originally of circular section and fairly large diameter, but have been formed into a section known as the "double eight." Up to a certain size of machine this form of spar has been found to be very good, and it is certainly simple to use, the attachment of fittings being a very easy matter. The wing ribs are of duralumin and consist of pressed webs which have lightening holes in them, and also vertical flutings formed on them for stiffness. Finally it should be pointed out that all steel parts are protected against corrosion by cadmium plating, and all duralumin parts anodically treated.



Fuselage "spool," wing root attachment and undercarriage strut of Fairey III F. (FLIGHT *Sketch.*)



A swivelling bracket for the wireless generator is provided on the Fairey III F. Below, welded and "spool" joints on the same type of aircraft. (FLIGHT *Sketches.*)

These brief notes must suffice as an indication of the broad general principles of Fairey all-metal construction, and the individual aircraft to be exhibited at Olympia can now be dealt with in what detail may be permissible in the case of each machine. Air Ministry restrictions will prevent a very full discussion of the features of several of the types, as they are still released for "Part Publication" only.

As the III F is the type by which the name Fairey has become known throughout the world, this will be dealt with first. It is probably a well-known fact that the Fairey III F is one of the most "versatile" types of aircraft ever produced in this or any other country. Apart from the fact that this type of machine can be supplied either as a two-seater, General Purpose landplane, as a Fleet Air Arm three-seater, as a Naval Reconnaissance machine, and as a landplane or seaplane in these various classes, the range is further extended by the fact that a great variety of engines, British and foreign, can be fitted according to the requirements of customers, water-cooled and air-cooled engines being installed as desired.

The Fleet Air Arm three-seater III F to be exhibited at Olympia will be fitted with a Napier "Lion XI" engine, and will be shown as a seaplane, with standard float undercarriage which consists of tubular steel struts carrying two Duralumin floats. The rear legs of the float chassis are telescopic and incorporate shock absorbing equipment. The floats themselves are large (each of about 190 cub. ft. volume), and carry water rudders on their sterns, operated by the rudder pedals of the air rudder controls. Provision is made in the design of the floats for attachment of beaching wheels, which can be quickly attached and again detached.

FAIREY "FOX" (Rolls-Royce "F").

FAIREY LONG-DISTANCE MONOPLANE (Napier "Lion").

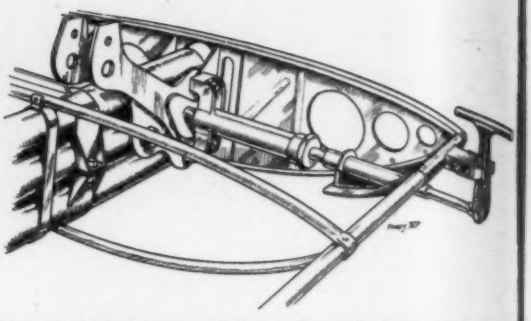
FAIREY "FIREFLY II" (Rolls-Royce "F").

FAIREY S.S. FIGHTER SHIPPLANE (Rolls-Royce "F").

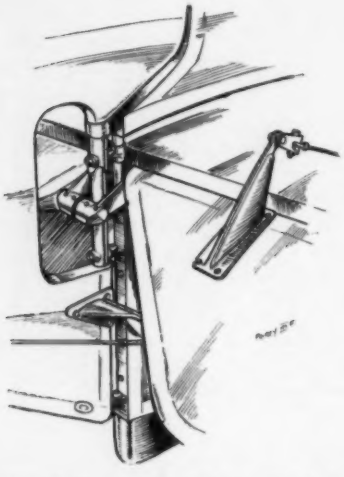
AT OLYMPIA

As already mentioned, the III F is produced both as a two-seater and as a three-seater. The seaplane exhibited has the three-seater arrangement, which differs from that of the two-seater mainly in the formation and dimensions of the deck fairings in the immediate vicinity of the rear cockpit.

The Fairey III F is characterised by a long slender fuselage of good streamline form, and by a two-bay biplane cellule in which the upper and lower wings are not staggered in relation to each other. The pilot's cockpit is situated just aft of the rear spar of the top plane, from which position he has a good view in nearly all directions. The seat is deep enough to take a seat type of parachute, and is so arranged that it can be raised and lowered easily during flight. The controls incorporate cam quadrants arranged to produce variable gearing between the pilot's controls and the control surfaces. This is achieved by means of cam quadrants in such a way



The locking pin arrangement for wing folding used on Fairey III F. ("FLIGHT" *Sketch.*)



The elevator flaps on the Fairey III F are jointed together. ("FLIGHT" *Sketch.*)

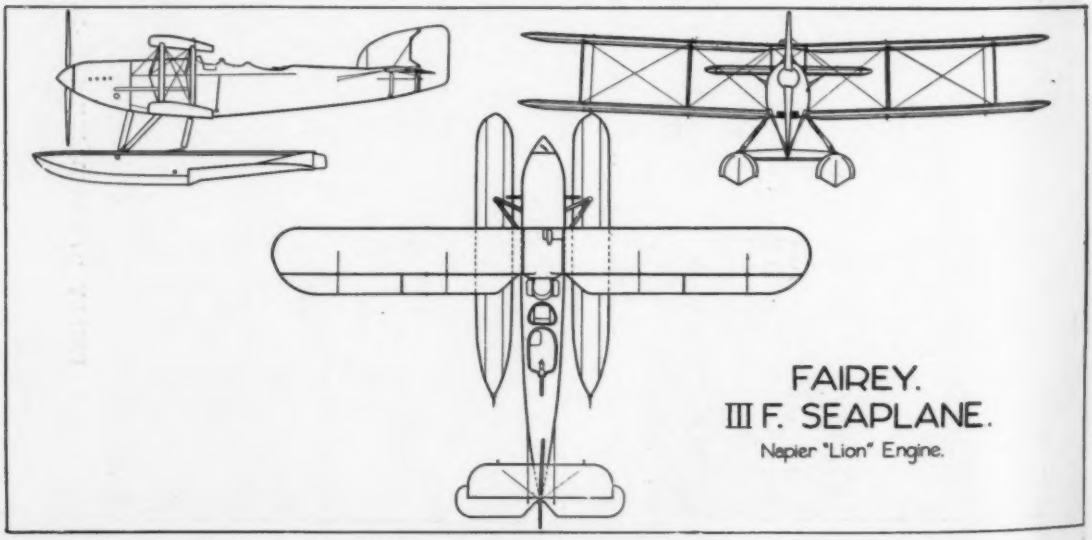
that as the control surface angle increases so an increasingly greater movement is made with the pilot's controls. This arrangement considerably lessens fatigue to the pilot, especially, of course, on flights of long duration. A very full equipment of instruments is provided, as well as guns, ammunition and variable camber gear.

In the Fleet Air Arm type of III F the rear gunner occupies the third seat, while between him and the pilot, but in the same cockpit as the gunner, is the seat for the wireless operator. Between the two cockpits is a metal partition, in the lower portion of which are mounted an airspeed indicator, altimeter and watch, an arrangement which allows an easy reading to be taken by the occupants of the rear cockpit when lying in a prone position for the purpose of sighting for bomb dropping. In the floor is a trap door below which, in the fuselage bottom fairing, there is a sliding panel which is kept closed when the trap door is closed, thus avoiding the break in the airflow that might occur even when the trap door was closed. The bomb sight for prone bombing is arranged to be mounted on the trap door frame.

A full-size survey type of camera is mounted centrally towards the rear of the cockpit, a movable trap door being provided in the floor. All types of Fairey III F aircraft are bonded for radio, and every provision is made for the installation of the necessary apparatus. Tapping keys are provided in the pilot's as well as in the rear cockpit. The radio generator is attached to a swinging arm mounted on the starboard side of the cockpit, and is operated by means of a non-reversible worm gear which swings the generator from its stowage position within the cockpit to its outboard position in the air stream.

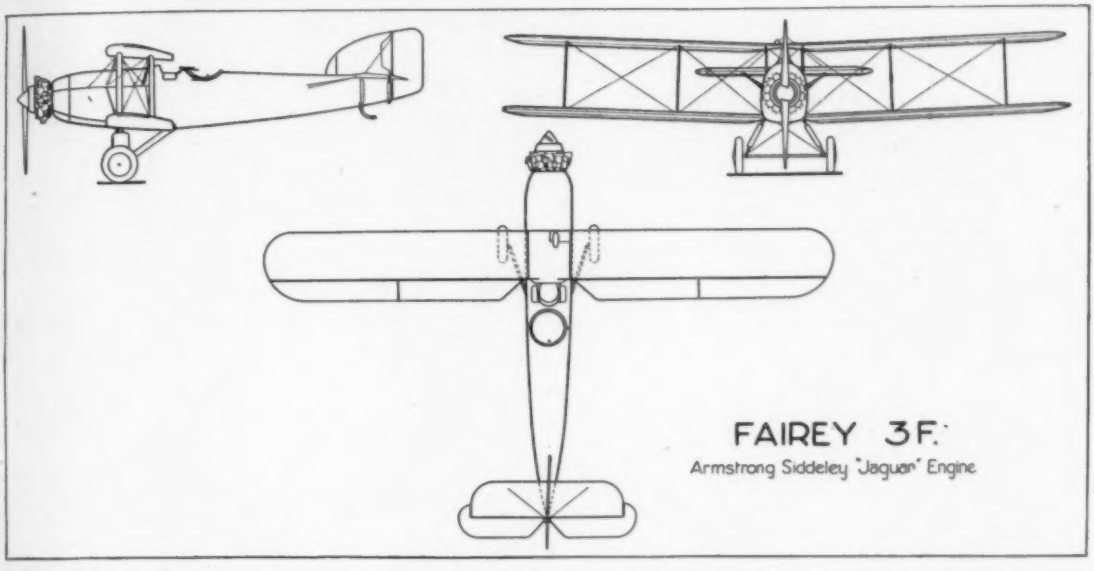
The armament consists of two machine guns and a quantity of bombs. The forward gun, operated by the pilot, is of the belt-fed type, while the rear gun, in charge of the gunner, is of the drum-fed type. The front gun is mounted on the port side of the cockpit, and fires through a blast-channel let into the fuselage fairing and engine cowling. The gun sights, which may be of the ring and bead type, or of the "Aldis" type, are mounted on the upper deck fairing of the fuselage immediately in front of the pilot's line of vision. An ammunition box holding 600 rounds is mounted in front of the pilot, and is quickly detachable for refilling.

The rear gun mounting may be either of the Scarff ring pattern, or the new Fairey-type gun mounting which has been specially designed to meet the requirements arising



from the increased performance and manœuvrability of modern aircraft. Pegs are provided within the rear cockpit for five double drums of ammunition for the rear gun. The new Fairey gun mounting is remarkable on account of the great area of fire which it enables to be covered, and, in addition it is some 15 lbs. lighter than the ring type. Moreover, when not in use the gun stows into a recess in the deck fairing without having to be removed from the mounting; thus the gun, although out of the way and offering no extra resistance, is ready for action at a moment's notice.

As regards the bomb part of the armament, the Fairey III F is arranged to take various bomb loads as standard equipment. As an example it may be mentioned that a total of two 230-lb. or 250-lb. bombs and four sighter bombs may be carried. Or four 112-lb. bombs and four sighter bombs. Or again, two racks of four 20-lb. bombs can be used, but other arrangements can conveniently be carried out. As a rule, separate release controls are provided for the pilot and bomber, while the fuse levers are so placed as to be within reach of either. All bombs are carried outboard under the lower planes.



The power plant of a Fairey III F of any type may, as already mentioned, be almost any water-cooled or air-cooled engine of suitable power (450-600 h.p.). In the seaplane exhibited at Olympia it will be a Napier "Lion XI" of 6 to 1 compression ratio. As mentioned previously, the engine mounting is a welded steel tube structure, and a fireproof bulkhead separates the engine from the front part of the fuselage. The fuel system consists of an engine-driven petrol pump delivering fuel to the carburettors through a special design of hand pump, which can be operated instantly by the pilot should necessity arise. The normal fuel tank capacity is 124 gallons, giving a range at cruising speed of approximately 700 miles. If desired "bomb" tanks can be attached in the position under the lower wings normally occupied by bombs, when the range at cruising speed may be extended to about 1,450 miles.

It is regretted that no performance figures can be published, the Fairey Aviation Company having made it a rule not to do so.

The second complete Fairey III F to be exhibited will be a two-seater General Purpose type, fitted with an Armstrong Siddeley "Jaguar VI" engine. Apart from the fact that it will be shown as a land plane, and will, as a General Purpose machine, carry somewhat different equipment, such as a spare wheel, desert equipment, etc., this machine is very similar to the seaplane just described, the notes on which will therefore, in the main, serve to describe this type also. The undercarriage is, of course, different, and a few notes dealing with this may be of interest. Of plain Vee-type, with cross axle, the undercarriage of the Fairey III F General Purpose machine makes use of rubber blocks in compression for absorbing the landing shocks, while an oleo damper gear checks bouncing. The rubber blocks are arranged in two columns, one in front of the other, so that the whole leg can be enclosed in a neat streamline fairing. A feature of the oleo damping gear is that an adjustment is provided whereby the amount of damping can be varied to suit local conditions.

The Fairey "Fox" is a high-performance Light Day Bomber, fitted with Rolls-Royce "F"-type water-cooled engine. To the Fairey Aviation Company must be given the credit for having introduced this class of machine, which, with its very high performance and great manœuvrability, is a most effective weapon of offence. In the "Fox," a high performance has been attained by refined aerodynamic design, and by fitting a water-cooled engine of very small frontal area. To begin with, the fuselage is kept of good streamline form and no excrescences are permitted to break the smooth airflow, such accessories as petrol pumps, generators, etc., being accommodated within the fuselage. The wings are of biplane formation, but only a single bay is used on each side.

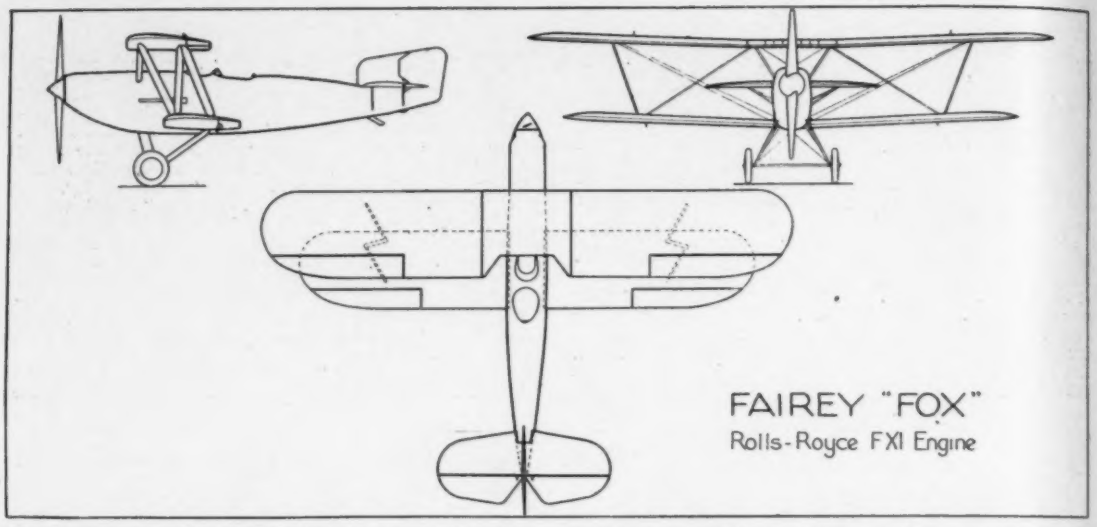
Constructionally, the "Fox" marks a transition period between the now old-fashioned wood construction and the latest all-metal construction in that, although the front portion of its fuselage is of steel tube construction, the rear portion of the fuselage is of ash and spruce, braced by swaged tie rods, while the wings have built-up wooden box spars and wooden ribs.

The engine (a Rolls-Royce "F"-type) is mounted in the nose, on a welded steel tube structure, and the cooling system is unusual in that a wing radiator is used, in addition to the retractable radiator. An advantage of this system is that air resistance is decreased because the area of retractable radiator surface that normally needs to be exposed is very small, the greater proportion of the heat being dissipated by the wing radiator, the air resistance of which is practically negligible. Fuel is supplied to the carburettors through a single-pipe line from the main tank, which is situated within the fuselage. An engine-driven fuel pump feeds the circuit, while an auxiliary hand pump is incorporated in the fuel system, so that if at any time the engine-driven pump should fail, the fuel supply can be maintained by this pump.

The undercarriage of the "Fox" is of plain Vee-type, with oleo-damped rubber block springing. The amount of damping can be adjusted to suit local requirements.

In the pilot's cockpit there is, in addition to the usual flying and engine controls, a very complete set of instruments, as well as the Vickers, or similar type machine gun. The pilot's seat will accommodate a seat type of parachute, if desired. Excellent protection is afforded to the pilot by a good windscreen, and by the cockpit coaming, which is fairly high, without, however, interfering with the view. The beading of the cockpit opening is well padded to protect the pilot.

There is a single flap-up seat in the rear cockpit, and when this seat is folded and a trap door in the floor opened, an effective prone bombing position is available, the bomb sight being fixed in the trap-door aperture, and the bomb



release controls coming readily to hand on the starboard side of the cockpit floor.

The wiring connections of the radio apparatus are interesting. All wiring in the machine, such as that for bonding, generator, and battery, amounting to eight or more cables, is brought to a single strip panel in close proximity to the radio set. This panel is arranged with plug and socket fittings, and in this way is connected to the set. In order to detach the set, all that is necessary is to disconnect these fittings, and the set is ready to be detached.

The armament of the "Fox" consists of two machine guns and a number of bombs. The front gun is a Vickers, or similar type, mounted on the port side, in a gun tunnel in the fuselage fairing, and with the sights, bead and ring or "Aldis" type, centrally placed in the direct line of vision of the pilot. The rear gun, owing to the high speed of the machine, is placed on a special type of Fairy gun mounting, to which reference was made in the notes dealing with the III F seaplane. Five double drums of ammunition can be carried. As regards bombs, the standard "Fox" is arranged with release quadrants and levers to carry any of the following bomb loads: two 230-lb. bombs, or four 112-lb. bombs, or two 4 × 20 lb.-bomb racks. All bombs are carried under the lower main planes.

The Fairey Long-range Monoplane, with Napier "Lion" engine, which, some months ago made a non-stop flight from Cranwell, Lincolnshire, to Karachi, will be exhibited mounted above the offices on the Fairey stand at Olympia. But little information is permitted to be published concerning this machine, which will, in all probability, be used for making another attempt on beating the existing world's distance record. The machine is a pure cantilever monoplane with tapering wings, large span, very small fuselage cross-sectional area, and therefore of high aerodynamic efficiency.

Petrol tankage is provided in the wings for considerably more than a thousand gallons. These tanks feed by gravity to a collector tank in the floor of the fuselage, whence the fuel is pumped to the engine.

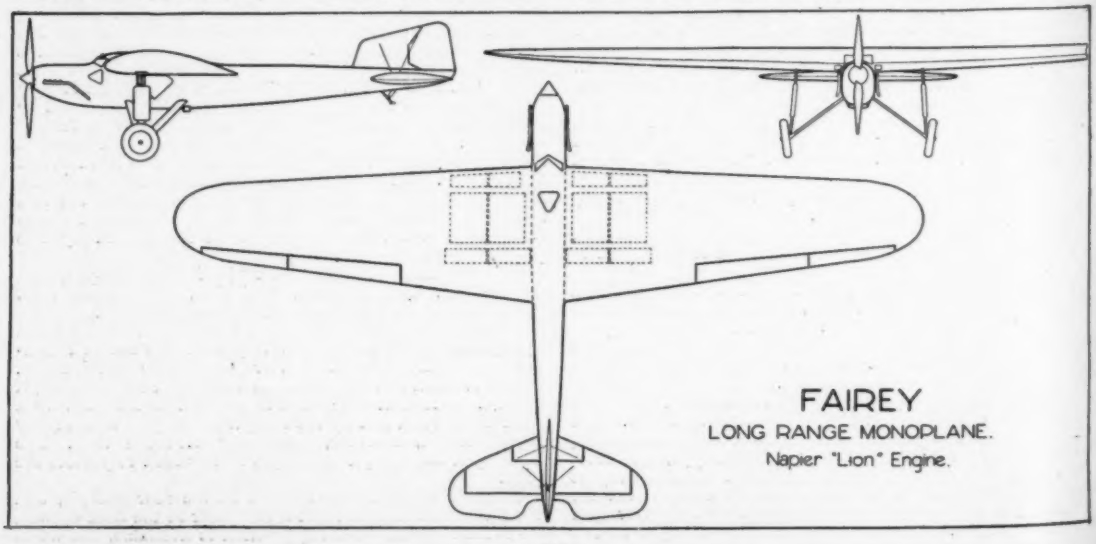
The cabin is totally enclosed, and it may be recollected that at the end of the recent long-distance flight, the crew of the machine spoke very highly of the comfort which the cabin afforded for prolonged flying.

The main dimensions of the Fairey long-distance monoplane are as follows: Length overall, 48 ft. 6 in.; wing span, 82 ft.; wing chord at centre, 16 ft.; mean wing chord, 11 ft.; total wing area approximately 900 sq. ft. Overall height, 12 ft.

Concerning the remaining three Fairey types to be exhibited at Olympia comparatively little may be said, these machines being still on the "Part Publication" list of the British Air Ministry. Nor, we very much regret, has it been found possible to include three-view general arrangement drawings of them. The general appearance of these three Fairey machines is, however, shown by photographs.

The Fairey "Firefly II" is a Single-seater Interception Fighter fitted with Rolls-Royce "F"-type supercharged engine. It has been designed to combat high-speed day bombers and single-seater fighters, and therefore combines great climbing power and extreme manœuvrability with very high speeds at altitudes of 20,000 ft. or more.

The "Firefly II" is of extremely "clean" aerodynamic design, and is a single-bay biplane of all-metal construction



except for the covering, which is fabric. All metal parts are specially protected against corrosion. The upper wing is of considerably greater chord than the lower, and the two wings are heavily staggered in relation to each other, an arrangement which helps to give the pilot a good view in all directions. The fuselage is very carefully streamlined, and has quickly-detachable cowling covering all working parts.

In view of the requirements of manœuvrability at high speeds, the greatest care has been taken to develop light and effective controls. The ailerons, for instance, are of narrow chord and high aspect ratio. The tail plane incidence can be altered during flight.

A Rolls-Royce "F"-type supercharged engine is fitted as standard, and has a cooling system somewhat similar to that of the "Fox" *i.e.*, a wing radiator on the top centre-section in addition to the retractable radiator. The fuel supply is carried within the section of the main planes.

The undercarriage is a simple Vee type with cross axle, and incorporates a special type of shock-absorber leg and pneumatic wheel brakes. The tail skid is of the self-tracking type, and is readily accessible through its inspection panels.

Following are the main dimensions of the Fairey "Firefly II": Length overall, 24 ft. 6 in.; wing span overall, 32 ft.; chord of upper wing, 5 ft. 1½ in.; chord of lower wing, 4 ft. 1 in.; height overall, 8 ft. 8 in.

The Fairey Single-seater Fighter Shipplane has been developed essentially for Fleet Air Arm duties, and provision has been made in its design for the use of an alternative float-type undercarriage converting it to a single-seater fighter seaplane.

As either a shipplane or seaplane it is capable of very high maximum speeds, extreme manœuvrability and abnormal climb, while, as a shipplane, the special form of wheel brakes, combined with the low speeds obtainable, enable easy landing to be made in a restricted space such as the deck of an aircraft carrier. Like the "Firefly II," the shipplane is of all-metal construction with the exception of the covering, and the wings are of unequal chord and heavily staggered. The pilot's seat can be adjusted for height, so that what with the wing arrangement and location in relation to the top plane, he obtains an excellent view.

A supercharged Rolls-Royce "F"-type engine is fitted as standard, and like the "Firefly II" the shipplane has both retractable and wing radiators. The fuel tanks are carried within the fuselage and are fitted with jettison valves, The shipplane undercarriage is of the Vee type, with oleo legs and pneumatic wheel brakes. The seaplane version is fitted with anodically treated duralumin floats.

The main dimensions of the Fairey single-seater fighter shipplane are: Length overall, 25 ft. 6 in.; span, upper plane, 33 ft. 6 in.; upper chord 6 ft. 9 in.; lower chord, 4 ft. 1 in.; height overall, 8 ft. 7½ in.

In spite of its incredibly clumsy official title of "Two-seater Fleet Fighter Reconnaissance Shipplane," this Fairey machine, which will be exhibited as a seaplane, is a very interesting and novel type of Fleet Air Arm machine. In the shipplane form it is supplied with a land undercarriage.

Following somewhat on the lines of the famous "Fox," this machine has been designed to fulfil the requirements of Fleet Air Arm duties and is one of the latest types produced for this purpose. It is a two-seater biplane of all-metal construction, with main planes of unequal chord and fairly heavily staggered. The lower plane chord is quite small, and the machine might almost be classed as a "sesquiplane." The wings are made to fold. A fuselage of small cross-section, and yet with roomy cockpits, is employed, and the streamline form is exceptionally good for a two-seater. Quickly-detachable cowling is fitted to the engine installation and cockpits, which enables these parts to be readily inspected. Ailerons of the "Frise" type are fitted, as well as Handley Page automatic wing tip slots to the top plane. The tail plane incidence is variable.

A Rolls-Royce "F"-type supercharged engine is fitted as standard, and the cooling system includes both retractable and wing radiators.

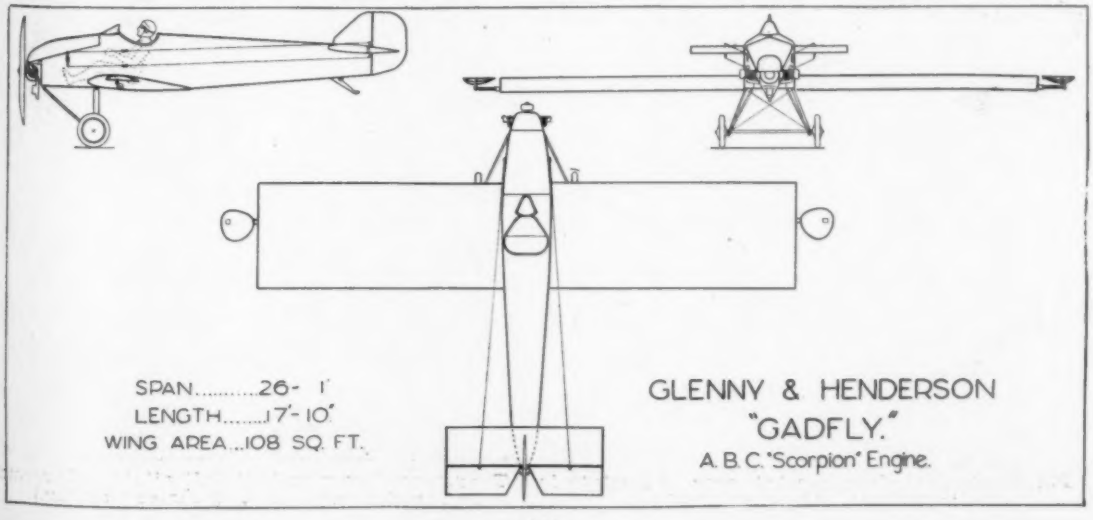
The Vee undercarriage of the shipplane version has special oleo legs of highly streamlined section, and independently-operated wheel brakes are fitted. The float undercarriage, which will be shown, has twin floats of Duralumin.

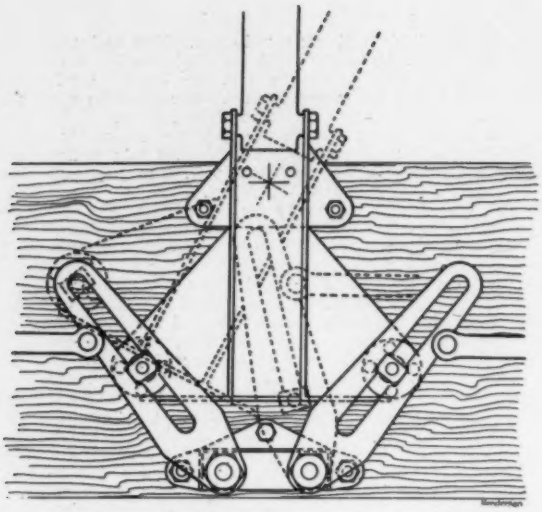
The Fairey high-speed gun mounting is installed in the rear cockpit. The top centre-section incorporates a hoisting sling.

The main dimensions of the Fairey "Two-seater Fleet Fighter Reconnaissance Seaplane" are: Wing span, upper plane, 37 ft.; upper chord, 7 ft. 3 in.; lower chord, 4 ft. 3 in.; overall height, 11 ft.

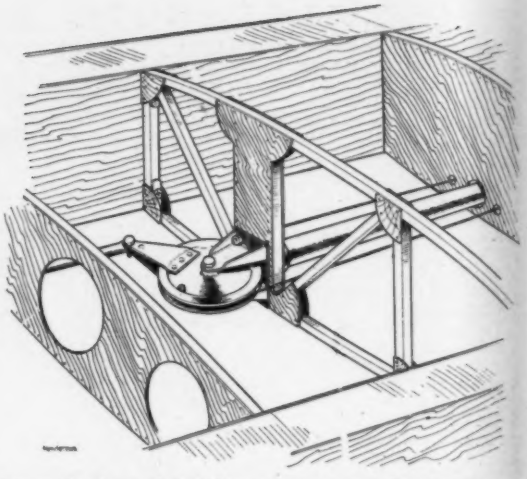
GLENNY & HENDERSON

THE "Motor Cycle of the Air" has long been the subject of speculation and discussion. The present-day two seater light 'plane, although it has attained immense popularity, is still a somewhat expensive type of aircraft, and although its popularity does not show any signs of diminishing, quite the contrary, there are many who believe that there is room nowadays for an alternative type in the form of a cheap, low-powered single-seater. Obviously the man who can afford to buy and run the two-seater will do so, but up to the present there has been no "second best," no alternative in other words, for the man of limited means. It must be borne in mind that it is not only the first cost which counts. To that must be added the cost of running and upkeep, not to mention insurance. If a single-seater can be produced at a cost of but little more than half the cost of the present two-seater, it would seem obvious that there is likely to be a market for such a machine, even if the inability to carry a passenger is admitted to be a serious handicap.





An ingenious differential control is used in the "Gadfly." Normal position shown in full lines, and maximum control position in dotted. ("FLIGHT" *Sketch.*)



From the joy stick tubes run to a crank on a pulley, and thence the rotary aileron is operated by cable in the "Gadfly." ("FLIGHT" *Sketch.*)

Lieut.-Col. G. L. P. Henderson has realised this, and some time ago he joined forces with Mr. Glenny and Captain Pearson and formed the firm of Glenny and Henderson, with works in York Road, Byfleet, Surrey. Captain Pearson designed for the firm a small low-wing monoplane fitted with the A.B.C. "Scorpion" engine, and it is this machine, to be marketed as the "Gadfly," which Glenny and Henderson will exhibit at Olympia.

Cheapness and simplicity were primary considerations in designing the "Gadfly," and consequently one finds such somewhat unsightly features as square wing tips and straight angular lines. However, beautiful lines do not necessarily make a machine fly any better, and something had to be sacrificed on the alter of economy.

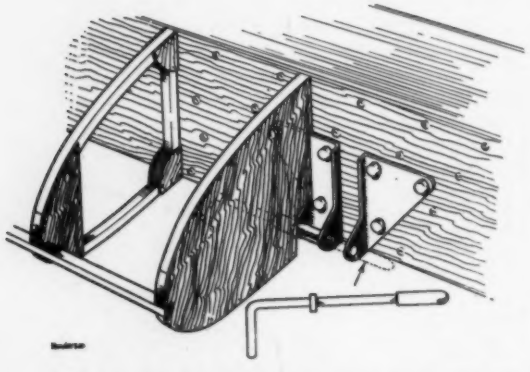
In the choice of constructional methods also simplicity and low production costs were kept prominently in view, and as a result the "Gadfly" is built largely of plywood, the fuselage being a semi-monocoque formed of an internal framework covered with three-ply, while the wing has box spars of spruce and plywood, wooden former ribs, and a three-ply skin or planking. The wing is built in one piece and rests in a recess in the bottom of the fuselage. The undercarriage strut attachments are so arranged as to clear the wing, so that the bolts securing the latter to the fuselage can be undone and the wing dropped to the ground without interfering with the undercarriage.

A feature of the "Gadfly" which is bound to attract a great deal of attention is the lateral control. Instead of the type of ailerons to which we have become accustomed, this machine will be fitted with the "rotary" ailerons invented by Capt. Pearson. This type of aileron is an auxiliary surface, in plan shaped like a shield or "heart," and rather peculiarly cambered. The aileron is swivelled around an inclined pivot. Normally both ailerons are at a small positive angle of incidence, say 4 degrees. When full control is put on, one aileron increases its angle to about plus six, while the other decreases its angle to something like minus 40 degrees. The drag on the negative aileron is great, and causes yawing in the right direction.

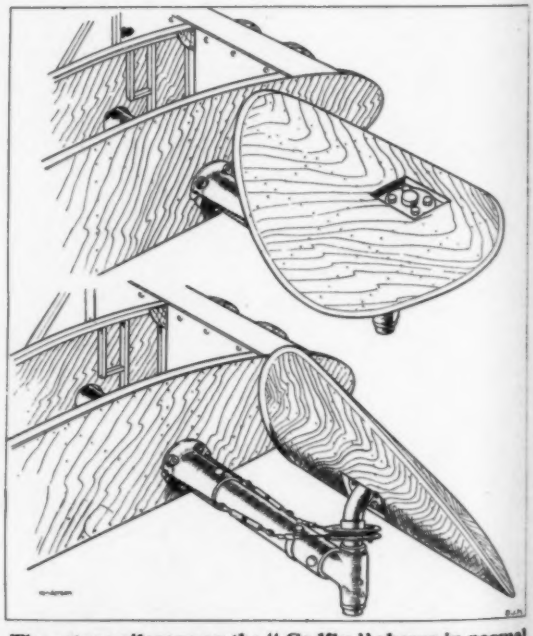
The tare weight of the "Gadfly" is 455 lbs., and the gross weight 750 lbs., the load being made up as follows: Pilot, 180 lbs.; petrol and oil, 82 lbs.; luggage, 33 lbs.

Overall dimensions are: Length overall, 17 ft. 10 in.; wing span, 25 ft.; wing area, 110 sq. ft.

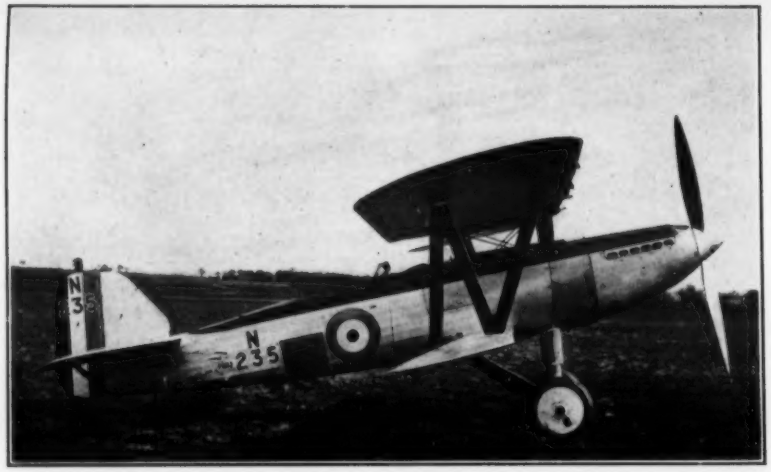
The following performance is claimed for the "Gadfly": Full speed near ground, 91 m.p.h.; cruising speed, 72 m.p.h.; stalling speed, 45 m.p.h. Initial climb, 500 ft./min. Ceiling 13,000 ft.



Pin attachment of main wing spar to fuselage in "Gadfly." ("FLIGHT" *Sketch.*)



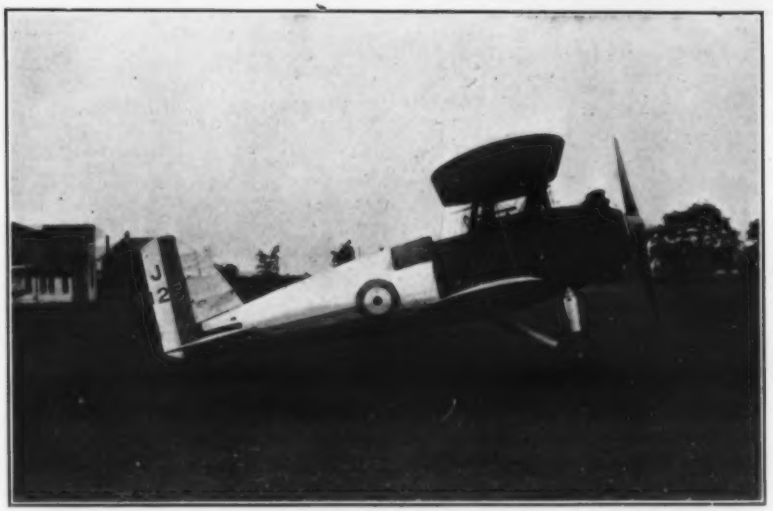
The rotary ailerons on the "Gadfly" shown in normal and maximum position. ("FLIGHT" *Sketches.*)



FAIREY 2-SEATER FLEET FIGHTER (Rolls-Royce "F").

GLENNY & HENDERSON "GADFLY" (A.B.C. "Scorpion"). ("FLIGHT" *Photo.*)

GLOSTER "GNATSNAPPER" (Bristol "Mercury II"). ("FLIGHT" *Photo.*)



GLOSTER S.S. FIGHTER (Bristol "Mercury IIa"). ("FLIGHT" *Photo.*)

AT OLYMPIA

GLOSTER AIRCRAFT CO., LTD.

FOUR complete aircraft will be exhibited on this stand, and in addition, there will be on view a large series of metal wings showing the development of Gloster all-metal aircraft construction dating back to 1917, and illustrating in the most convincing manner possible, the progress made during a period of more than ten years.

The four complete aircraft to be exhibited are: A twin-engined air survey machine (to be shown in skeleton), a "Gnatsnapper" single-seater shipplane, another Gloster single-seater fighter, and the little "Gannet" single-seater light 'plane designed for the Lympne competition of 1923.

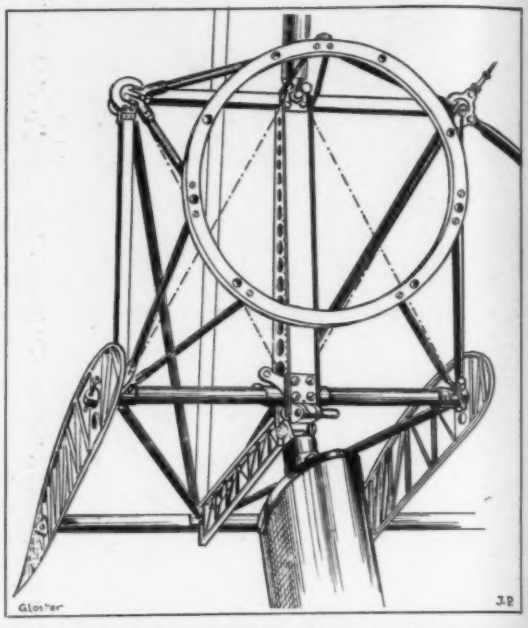
The air survey machine is a biplane, and was designed as a landplane to fulfil the special requirements of air survey work, but it can be adapted as a seaplane if required. It is fitted with two Bristol "Jupiter XI" commercial type air-cooled radial engines, giving 465 h.p. at 2,000 r.p.m., or the following engines can be fitted instead:—Siddeley, geared "Jaguar," Pratt and Whitney, "Hornet," or Wright "Cyclone." The machine is of metal construction throughout, and the position of the cockpit is designed to give the best possible forward view for photography. Special attention has been paid in design to the construction and the subsequent treatment of materials in order to withstand all types of climatic conditions. Also, special attention has been given to the general and detail design, in order to reduce cost of maintenance to a minimum, and to obtain easy accessibility and quick detachability. Large components being designed in detachable sections in order that ease in transport is obtained.

The fuselage is constructed in three detachable sections, mainly of steel and duralumin, suitably braced and faired off with fabric and panelling. The two front portions are built up of square-section tubing with very simple flat plate joints, the rear portion being of round tubing, with joints of the standard Gloster pressed-wrapper plate type.

The wings are of orthodox design, having spars constructed of high-tensile steel, using the Gloster patent lattice spar construction. The ribs are of duralumin.

The Gloster Patent lattice spar has been under development since 1923, and is specially suited for thick wings, bearing in mind strength/weight ratio, rigidity to resist deflection and vibration, cheap construction, ease of assembly, ease of replacement of any part of the wing under service conditions, and torsional rigidity.

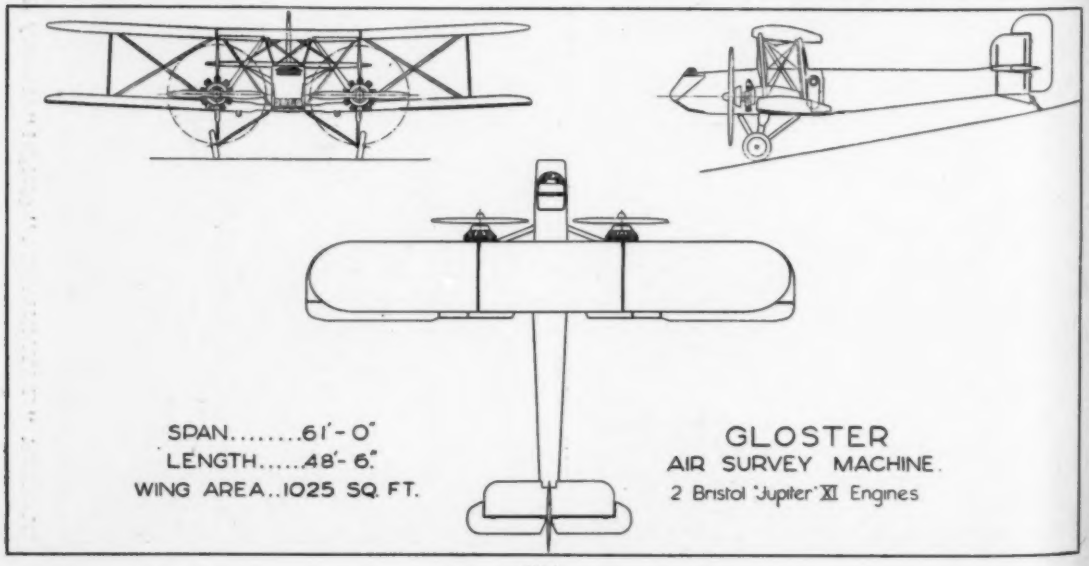
With the Gloster lattice spar, the full depth of wing is used, thus obtaining the full advantage of the depth of section for strength purposes, and bridge pieces are formed in order to receive the duralumin rib sections which are attached by special bolts. The ribs are attached to the spars in three sections, leading edge, centre section, and trailing portion. Therefore the ribs, if damaged, can be easily replaced. In fact, the whole assembly is such that with a working diagram, a wing could be readily put together under normal service conditions.

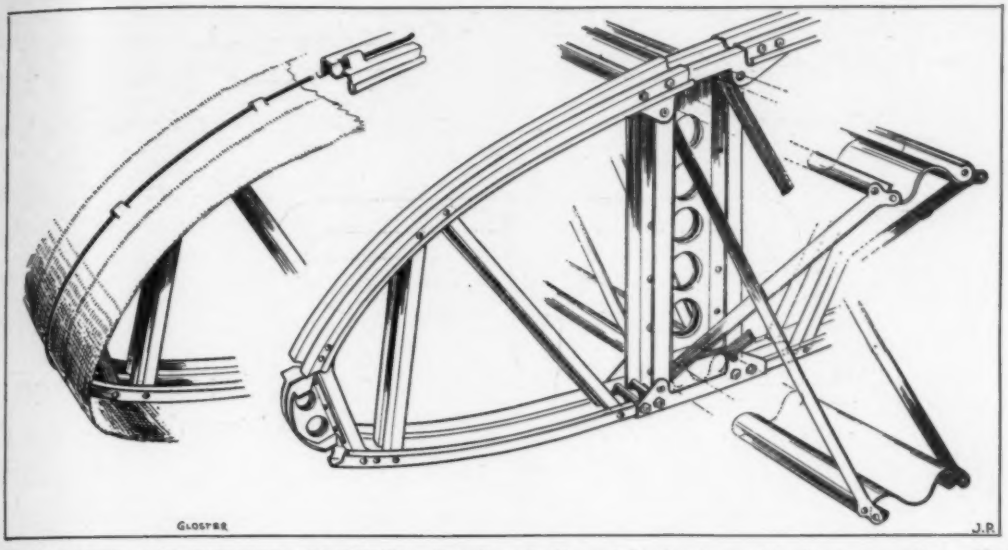


Engine mounting and undercarriage strut attachment on the Gloster Air Survey machine. ("FLIGHT" *Sketch.*)

The method of fixing the fabric to the wing ribs in the slipstream has also been given careful consideration, and the Gloster patented wired-on method adopted. The fabric is placed in position, together with a layer of tape, then rustless wire is threaded through eyelets formed in the rib and locked under the head of the bolts attaching the leading and trailing edges. It should be mentioned here that this method of fixing fabric has been tested in flight at the Royal Aircraft Establishment over a period of four years, and found entirely satisfactory.

The tail plane is of the monoplane type, and is adjustable from the cockpit for various speeds and conditions of load. Its construction is H.T. steel spars and duralumin ribs. The rudder and fin are also of metal construction, and the rudder control is so designed in order to meet the





THE GLOSTER AIR SURVEY MACHINE : Details of rib and lattice spar (steel) construction. Note the method of holding the wing fabric on with a wire.

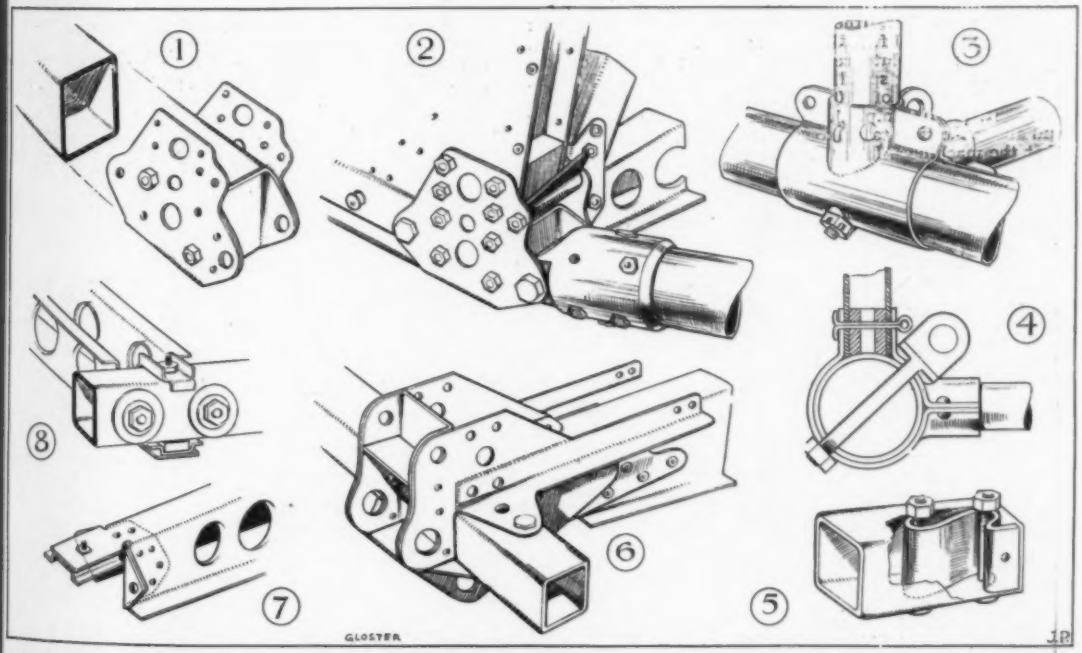
conditions of dual control that the position of the rudder can be adjusted from either seat by the pilot, in order to provide directional trim with either engine " off."

The undercarriage is arranged in two halves, each forming a triangulated Vee structure. This arrangement eliminates the usual long axle close to ground, which would be unsuitable for rough grounds, etc. The shock absorbers are fitted in the main short legs, and are of the oleo type, having 9-in. travel. The first impact is taken on an oil dashpot and taxying on rubber buffers in compression.

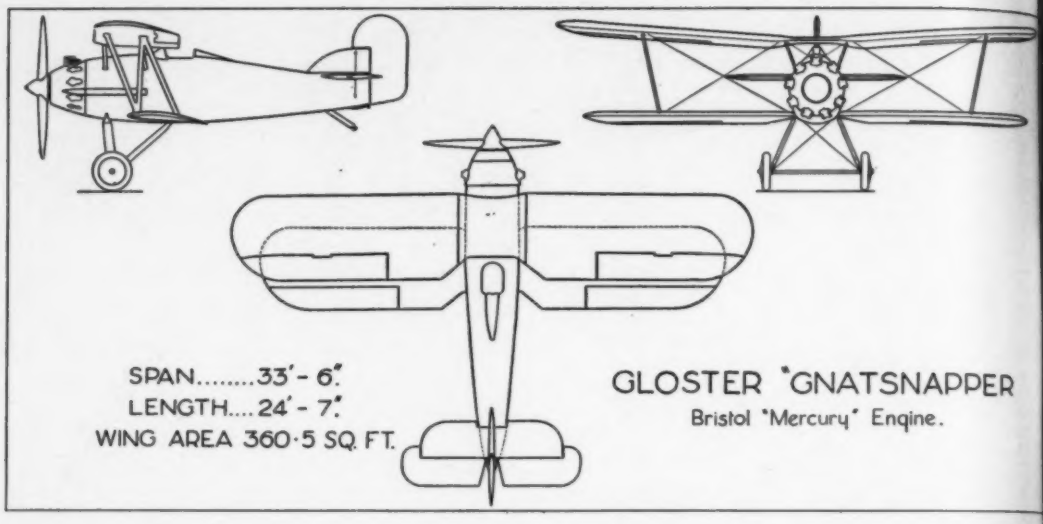
The controls are of the dual type, and are of a robust nature, positive in operation, and having generous areas for all moving parts. To reduce wear, all important bearings are provided with grease gun lubricators. Tie rods are used in all cases in place of the usual stranded cables, thus giving longer life and immunity from stretch.

The pilot's cockpit is placed in the nose of the aircraft, and is accessible from the main cabin by a door. It is fitted with the following instruments and equipment: Airspeed indicator, aneroid, revolution indicators, oil pressure gauges, oil temperature gauges, watch, cross level, compass, fire extinguisher (Essex type), safety belt, instrument lighting set, petrol contents gauge (Skelton), turn indicator.

The photographer's cabin is equipped with special photo-



FUSELAGE DETAILS OF GLOSTER AIR SURVEY MACHINE : 1, Square longerons are used in front portion, with flat-plate joints. The rear portion uses round tubes, attached to the square tubes as shown in 2, while 3 shows a typical fuselage (rear portion) joint. This is shown in section in 4. S-shaped strips are used for internal stiffeners, as in 5. Wing and chassis attachments are shown in 6, and flooring in 7 and 8. (" FLIGHT " *Sketches.*)



graphic equipment, three separate camera positions being provided on the machine.

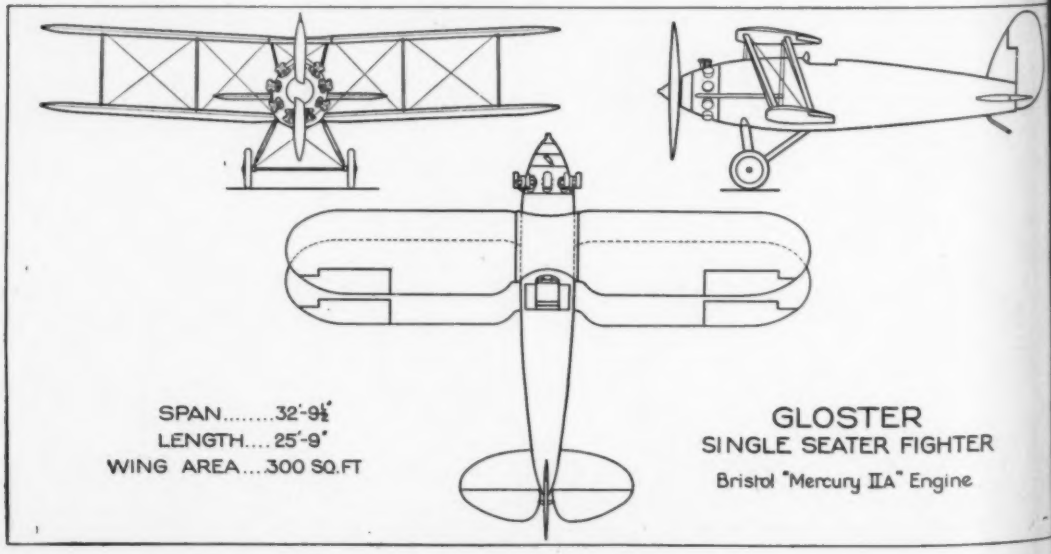
The main dimensions of the Gloster air survey machine are: Length, overall, 48 ft. 6 in.; wing span, 61 ft.; wing chord, 9 ft.; wing area, 1,025 sq. ft. The maximum gross weight is 8,570 lbs., which corresponds to a petrol capacity of 240 gallons, an oil capacity of 31 gallons, and a survey load of 840 lbs. The tare weight is 5,615 lbs., composed as follows:—Power units, 2,270 lbs.; tank system, 350 lbs.; structure, 2,995 lbs. The disposable load may be divided as follows: Petrol (240 gallons), 1,820 lbs.; oil (31 gallons), 296 lbs. Survey load (crew of two and equipment), 800 lbs.; instruments, 40 lbs. This represents the maximum amount of fuel and, of course, maximum endurance. Normally, it will not be necessary to carry quite so much, and the normal tankage is 200 gallons of petrol and 27 gallons of oil.

The estimated performance of the Gloster air survey machine is as follows (the figures referring to normal load): Full speed at 1,000 ft., 131 m.p.h.; full speed at 20,000 ft., 114 m.p.h.; absolute ceiling, 23,200 ft.; service ceiling, 21,900 ft.; stalling speed, 47 m.p.h. Endurance at 1,000 ft. (at cruising speed of 110 m.p.h.), 4·5 hrs. Endurance at 20,000 ft. (at 100 m.p.h.), 6·5 hrs. The last figure is over and above the time taken to reach 20,000 ft. It is estimated that the machine will not only be able to fly on one engine with normal load, but that under these conditions it will have a ceiling (absolute) of no less than 10,400 ft. With the extra tankage, the performance is not reduced to any marked degree, but the endurance at 20,000 ft. is increased to 7·5 hrs.

The Gloster "Gnatsnapper" is a single-seater shipboard fighter, fitted with Bristol "Mercury II" engine. An alternative float undercarriage is available and can be fitted instead of the land undercarriage very quickly. The main dimensions are: Length o.a., 24 ft. 7 in.; span of top plane, 33 ft. 6 in.; span of bottom plane, 30 ft. 5 ft. 3½ in.; wing area, 360 sq. ft. The weight of the machine fully loaded is 3,800 lbs.

The other Gloster single-seater fighter has been designed for rapid climb to a great altitude, and for high speed at that altitude. It is a land machine of all-metal construction fitted with Bristol "Mercury IIA" engine. In its construction this machine incorporates the latest developments of Gloster metal construction, and special care has been taken in the anti-corrosion treatment. The main dimensions of the Gloster single-seater fighter are: Length o.a. 25 ft. 9 in.; wing span, 32 ft. 9 in.; wing chord, 5 ft. 3 in. wing area, 332 sq. ft. The total loaded weight is 3,270 lbs.

The Gloster "Gannet" was originally entered for the 1923 Lympne light 'plane meeting fitted with a Cant two-cylinder two-stroke engine. This was later replaced



by a Blackburne engine of 649 c.c., and it will be with the latter engine that the "Gannet" will be shown at Olympia. The "Gannet" is a very diminutive equal-span biplane single-seater, and of entirely orthodox construction. The fuselage is of the semi-monocoque type, with light framework covered with three-ply wood. The wings are normal two-spar structures designed for one-man folding. Behind the pilot's cockpit is a locker for luggage. A fireproof bulkhead separates the engine from the cockpit. The petrol tank (capacity 2 galls.) is housed in the centre section of the top plane, and gives direct gravity feed to the engine. The undercarriage is of simple vee type with rubber cord shock absorbers. When the wings are folded, the machine has an overall width of 6 ft. 8 in. only, so that it can be housed in an ordinary garage.

The main dimensions of the "Gannet" are: Length, o.a. 16 ft. 6 in.; wing span, 18 ft.; wing chord, 3 ft. 1¼ in.; wing area, 103 sq. ft. The tare weight is 292 lbs., and the load 168 lbs., giving a gross weight of 460 lbs. The power loading is 18·4 lb./h.p., and the wing loading 4·5 lb./sq. ft. With this loading the performance is: Full speed at ground level, 72 m.p.h.; cruising speed, 64 m.p.h.; landing speed, 35 m.p.h. Although the "Gannet" is not a new machine, the revival of the small single-seater makes it interesting again.

HANDLEY PAGE, LIMITED

CONCERNING the the Handley Page exhibits at Olympia we are not, unfortunately, able to give our readers any very detailed account, as one of the machines to be shown is a recent production and may only be referred to rather vaguely, while of the other machine, the new large four-engined passenger carrier, the saloon portion only will be shown.

By far the largest commercial machine ever produced in this country for regular use as a passenger carrier on air routes, the new four-engined Handley Page will have seating accommodation for no less than 40 passengers. The saloon is divided into two separate ones, with a lavatory and a large luggage compartment in between them. The reason, or one of the reasons, for this arrangement is, we understand, that in this manner there is no passenger sitting in line with the propellers, so that should one of the airscrews burst, the pieces might be flung through the fuselage but would not be likely to injure anyone.

The four-engined Handley Page will be of all-metal construction, and the fuselage portion to be shown at Olympia will have not only its main framework but also the covering of metal. The tail portion of the fuselage, which will not be shown, will have a tubular framework and fabric covering.

Many unusual features will be found in the general lay-out of the machine. For example, the attachment of the lower wings to the fuselage is near the top instead of on the lower longerons. This does not mean that the entire lower wing is placed high in relation to the fuselage, as, for example, the lower wing in relation to the hull of a flying-boat, but that there is a distinct break in the lower planes as viewed from in front. From the lower engines, which are placed a considerable distance outboard, the lower wings slope upwards considerably until they meet the fuselage, forming, as it were, an anhedral angle, while the outer portions of the wings are set at a dihedral angle. The reason for this unusual arrangement is not, we believe, an aerodynamic but a practical one, the object being to provide a better view for the passengers, who will be able actually to look *under* the inner portions of the lower wing.

Apart from the arrangement of the lower plane, the wing bracing will be unusual in that no streamline wires will be employed. The entire structure will be strut braced, the struts forming, with the spars, a Warren girder. "Once rigged always rigged" is the motto which the Handley Page firm uses in this connection.

The engine arrangement is unorthodox in that all four engines drive tractor airscrews, *i.e.*, no tandem placing of engines is employed. This is achieved by placing two of the engines immediately under the top plane, as close together as the airscrew clearance will permit, while the two lower engines are mounted on the lower plane, far enough outboard for their propellers to clear the fuselage sides. It may be remembered that the French Bleriot firm produced one or two commercial aeroplanes of this type some years ago, so that there is precedent for such an engine arrangement. The petrol tank will be carried in the top centre-section, and will be high enough above the two top engines to give direct gravity feed to them as well as to the lower engines.

At the moment it is not, we learn, definitely decided which type of engines will be fitted in the new Handley-Page 40-passenger machine, but they will at any rate be radial air-cooled, and either Bristol "Jupiters" or Armstrong Whitworth "Jaguars." The new machine, if successful, will be operated by Imperial Airways, Ltd.

An Artist's Impression of the saloon of the Handley Page four-engined machine. View looking forward.

The Handley Page "Hare" is a two-seater bomber with Bristol "Jupiter" engine. The most remarkable feature of it, as regards outward appearances at any rate (which are the only features that may be discussed), is the extremely unorthodox wing bracing. Although a bomber, the "Hare" has but a single set of N struts on each side. The lift and anti-lift bracing is in the plane of the front spars only, and takes the form of a single strut on each side, sloping from the lower front interplane strut fitting to the top front spar near the attachment of the centre-section front strut. At first sight one receives the impression that the lift is ultimately transmitted to the undercarriage vee via the sloping struts below the bottom plane, but actually this is not, of course, the case. As far as the wing structure is concerned, these sloping struts could as well be replaced by a cross axle and wire bracing. They are taken outboard to the lower wing merely in order to provide a "split" undercarriage.

As we are about to go to press it is learned that the Handley Page "Hare" will not, after all, be exhibited, but that one of the "Hinaidi" twin-engined bombers will be exhibited instead. This machine is well known to our readers, and will need no description.

THE H. G. HAWKER ENGINEERING CO., LTD.

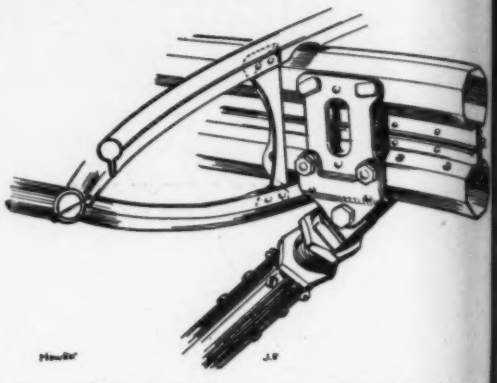
Of the three complete aircraft to be exhibited on the Hawker stand one will be the "Tomtit" two-seater training machine, while the other two will be a "Hart" day-bomber and a "Hornet" single-seater interception fighter, respectively. Air Ministry restrictions prevent a very detailed reference to the two military types, particularly the "Hornet."

The Hawker "Tomtit" is a two-seater training machine designed on very advanced lines inasmuch as it not only possesses a high performance for its power, but also includes in its equipment features not hitherto met with in a normal training machine. Chief among the novel features of the "Tomtit" must be classed the special equipment for teaching pupils to fly entirely "by instruments." To allow of this being done without possibility of the pupil "cheating" by glancing over the side, the pupil's cockpit is provided with a special type of hood which the instructor can pull over the cockpit, thereby entirely shutting off the pupil's view. That done, the pupil is compelled, if the instructor hands over the controls to him, to rely entirely on the instruments to guide him.

With the equipment supplied with the normal training machine this would be impossible, but in the "Tomtit" a special Reid patent turn indicator is provided, which shows the pilot whether or not he is maintaining a straight course. The smallest deviation is at once felt by the turn indicator, and the pilot is informed by the instrument not only that he is deviating from his course, but also whether he is turning to right or left. Inclinometers tell the pilot whether or not he is on an even keel, and of course the usual instruments, such as airspeed indicator and engine revolution counter, inform the pilot exactly what his machine and engine are doing.

This form of flying instruction has not previously been given in Great Britain, although in France and elsewhere work along the same lines has been carried out. The introduction of a special type of Reid turn indicator has made "blind flying" instruction possible on relatively small machines The object of teaching flying entirely by instruments is, of course, to accustom the pilot to fly his machine when visibility is at a minimum, such as at night or in clouds and fog, without a natural horizon to guide him. In the "Tomtit" a special floodlight system of dashboard illumination has been installed for use when the pupil's cockpit is covered by the hood.

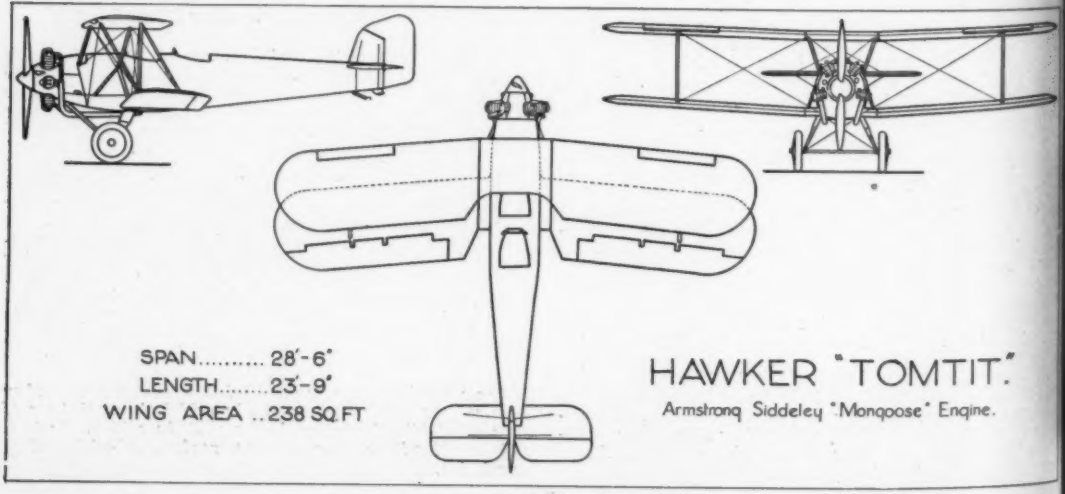
General features of the Hawker "Tomtit" are: heavily staggered biplane arrangement to give good view and to afford the occupant of the front seat an opportunity of getting clear by parachute in cases of emergency, all-metal construction, and efficient aerodynamic design resulting in a very good performance. Although designed as a training machine, the "Tomtit" would make a very fine mount for the private owner who wants something a little more "snappy" than the usual lower-powered two-seater. By covering the front cockpit over and generally "cleaning up" the machine, the "Tomtit" would also form a very useful racing mount.



A typical Hawker tail plane spar with its strut bracing, tail plane rib, etc.

Structurally the Hawker "Tomtit" is of interest in being of all-metal construction, incorporating most of the special constructional features developed by the Hawker company during the last two or three years. The fuselage is, as far as its main structure is concerned, built entirely of steel. The longerons as well as the struts are steel tubes, and the joints between them are extremely simple. The longerons in the "Tomtit" are circular section tubes, on which flats have been pinched on four sides at the points where the junctions with the vertical and horizontal struts are to be made. The flats thus formed provide convenient anchorages for the simple sheet metal fittings, bolts, etc., as shown by one of our sketches. Not only is this form of construction extremely simple and rapid, but it is cheap, not merely because of its simplicity, but also because by standardising a few sizes of fittings a complete range of machines can be covered, from a light plane up to a single-engined bomber. In ones or twos welded steel tube construction might be a little cheaper, but there seems little doubt that with real mass production the Hawker system would be very much quicker than welding, while the work of assembly could be done by unskilled or almost semi-skilled labour.

The wing construction of the "Tomtit" is also steel, the



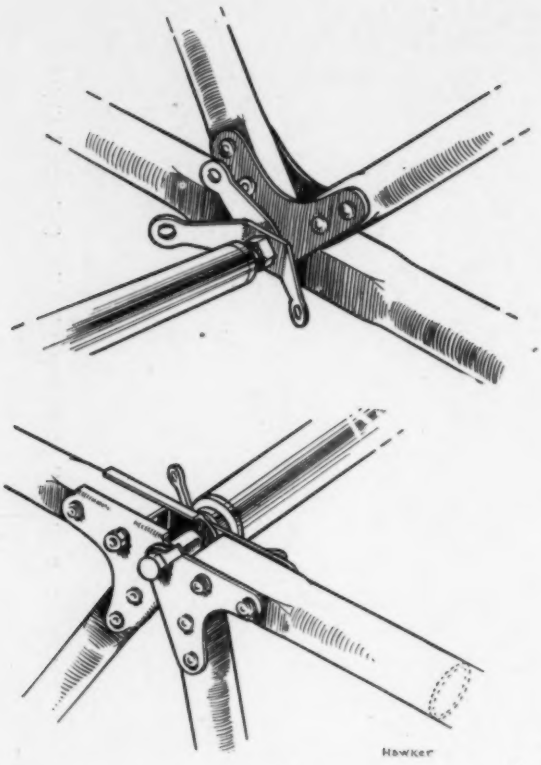
HANDLEY PAGE 4-ENG. COMMERCIAL (4 Radial air-cooled).

HANDLEY PAGE "HARE" (Bristol "Jupiter"). ("FLIGHT" *Photo.*)

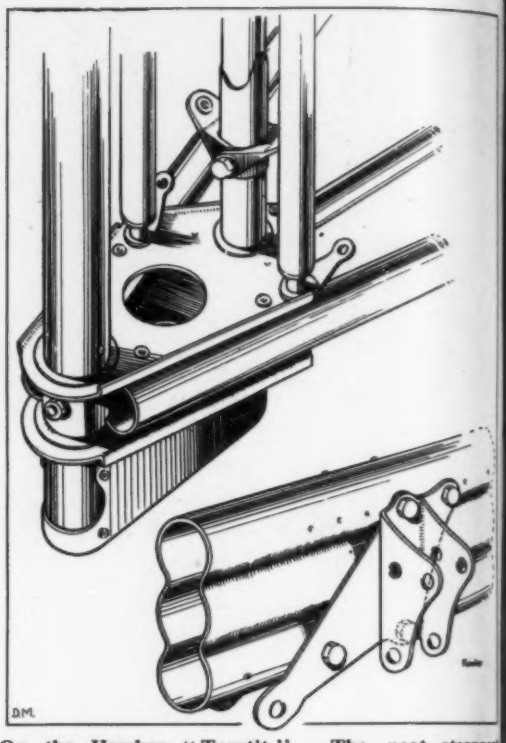
HAWKER "TOMTIT" (A.S. "Mongoose"). ("FLIGHT" *Photo.*)

HAWKER "HART" (Rolls-Royce "F"). ("FLIGHT" *Photo.*)

AT OLYMPIA



Typical fuselage details of Hawker "Tomtit" and other machines. Note the use of circular tubes, with flats formed on them. ("FLIGHT" *Sketches.*)



On the Hawker "Tomtit." The neat sternpost arrangement and, below, a wing spar with strut fitting. ("FLIGHT" *Sketches.*)

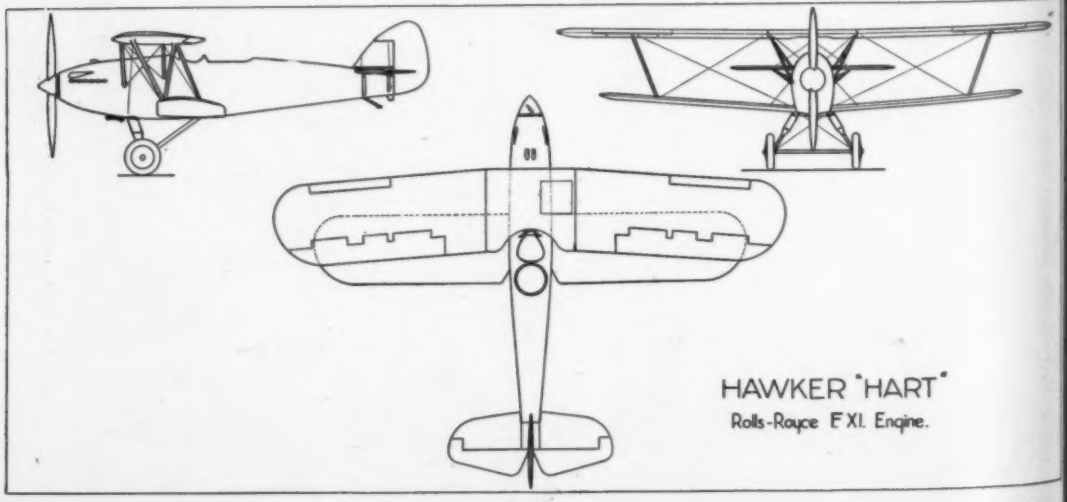
main spars being of the type known as the "double-eight" section, which is formed from a large-diameter steel tube originally of circular section. The wing fittings, such as those joining the inter-plane struts to the spars, are as simple in their way as are those of the fuselage, and it is to be assumed that the very low structure weights achieved in all Hawker machines are due very largely to the painstaking care taken in getting the small items, of which there are such large numbers in an aeroplane, as simple and as light as possible.

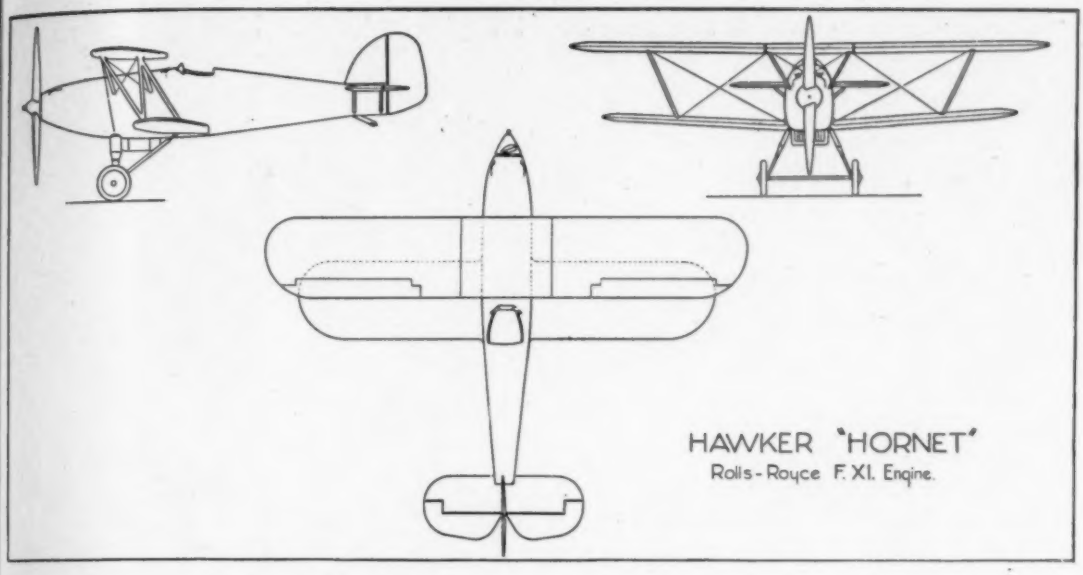
The engine fitted in the exhibition "Tomtit" is an Armstrong-Siddeley "Mongoose," but we are informed that if desired the machine can be supplied alternatively with A.D.C. "Hermes" engine. The petrol capacity is 24 gallons, which, with the "Mongoose" engine, gives a cruising range of approximately 350 miles.

The main dimensions and areas of the "Tomtit" are: Length o.a., 23 ft. 5 in.; wing span, 28 ft. 6 in.; height 8 ft. 8 in.; wing chord, 4 ft. 9 in.; wing area, 238 sq. ft. With a tare weight of 1,100 lbs. and a disposable load of 650 lbs., the gross weight of the "Tomtit" is 1,750 lbs., giving a wing loading of 7·36 lbs./sq. ft.

Performance figures for the "Tomtit" are: Full speed at 1,000 ft., 124 m.p.h.; at 3,000 ft., 122 m.p.h.; at 5,000 ft., 119 m.p.h.; and at 10,000 ft., 102 m.p.h. The climb to 1,000 ft. takes 1 minute; to 3,000 ft., 3 mins. 19 secs.; to 5,000 ft., 6 mins. 7 secs.; to 10,000 ft., 14 mins. 22 secs.

The Hawker "Hart" with Rolls-Royce "F"-type engine is a high-speed day bomber, which may also be employed as a Fleet fighter reconnaissance machine. If desired the





"Hart" can be put on a float undercarriage and used as a seaplane. The machine is of all-metal construction, and aerodynamically is of very "clean" design, a fact which is reflected in the performance figures. The "Hart" may be fitted with Rolls-Royce F.XI B or F.XI S engine, according to whether it is required to operate at great heights or only at medium heights. With the F.XI B engine the full speed at low altitudes is 184 m.p.h., and at 10,000 ft. 172 m.p.h. The climb to 10,000 ft. occupies 8 mins. If the supercharged Rolls-Royce F.XI S is fitted the full speed at 10,000 ft. becomes 187 m.p.h. and the climb to 10,000 ft. occupies but 7½ mins. This performance refers to the "Hart" as a bomber, and to an all-up weight of 4,320 lbs.

Concerning the Hawker "Hornet," but little may be said beyond the fact that it is a single-seater interception fighter, designed to deal with the modern fast day-bomber. In external appearance the "Hornet" is one of the most "eyeable" machines produced in recent times. It is of all-metal construction and fitted with Rolls-Royce F.XI S engine. No performance figures may be quoted, but the "Hornet" is claimed to be the fastest single-seater fighter in the world.

GEORGE PARNALL & CO.

Of the two complete aircraft to be exhibited on this stand, one will be the little "Peto" two-seater designed for service with submarines, while the other will be the new "Elf," a private owner's two-seater machine rather beyond the light 'plane class, fitted with the A.D.C. "Hermes" engine.

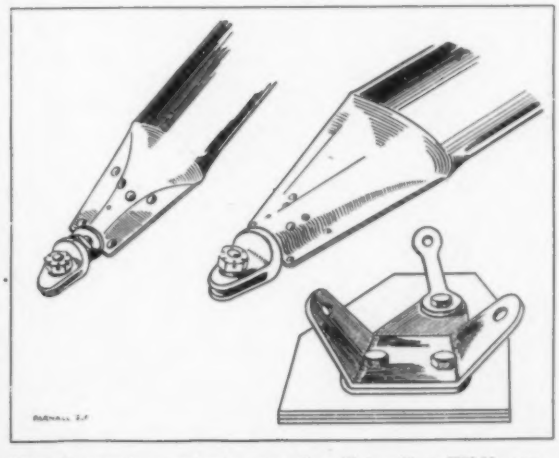
Certain features upon which the designers have concentrated in producing the Parnall "Elf" are: Improved view of pilot and passenger by seating them behind the top centre-section, which has been dropped almost to eye level; reduced maintenance cost and elimination of all truing-up, by adopting a Warren girder-type rigid-wing bracing; improved performance by efficient design and extra power; and the reduction of folded dimensions to a very small figure so as to enable the machine to be wheeled through an ordinary gateway.

From the three-view general arrangements it will be seen that the Parnall "Elf" is a biplane, with the top plane considerably larger than the bottom, and the wings staggered in relation to each other. Furthermore, the wings are swept back in order to get the centre of lift far enough back to bring the passenger behind the top centre-section. The only other unusual external feature in the wing design is the use of strut bracing throughout, the interplane struts forming a Warren girder as seen in front elevation. Visitors to Olympia will also notice that the fuselage is of generous dimensions, giving very roomy cockpits.

The fuselage is a semi-monocoque structure, with a light internal framework and three-ply covering. The dual controls are built up as a complete unit, and during construction the whole fuselage can be finished, with the exception of this unit, which is then slipped into place through the bottom of the fuselage. The two seats have pans for air cushions, or if the machine is employed for training purposes, or it is otherwise desired to do so, parachute packs may take the place of the air cushions. The fact that both cockpits are aft of the wings should enable both occupants to make use of their parachutes.

A Smith's type instrument board is provided for the pilot The dual controls make use of cranks and connecting tubes instead of cables and pulleys, the tubes being visible externally, sloping upwards from the sides of the fuselage to the cranks on the aileron tubes in the top plane.

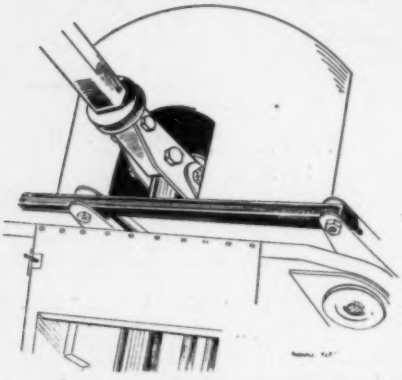
An extra large compartment for luggage, capable of taking one or two suitcases, guns, fishing rods, golf clubs or tent, etc., is situated immediately behind the pilot's cockpit, while



The Interplane struts on the Parnall "Elf" are arranged as a Warren girder. Sketches show strut ends and fittings. ("FLIGHT" *Sketches.*)

forward of the passenger's cockpit there is an auxiliary locker for tool kit and a spare can of petrol.

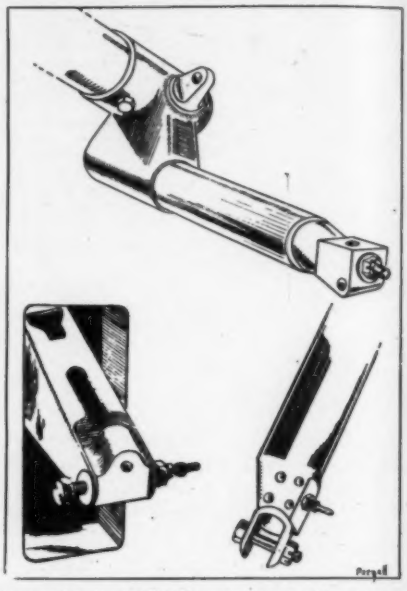
The biplane wings are of orthodox construction, with spindled I-section spars and wooden ribs. The drag bracing inside the wings is by tie rods, while the incidence bracing between the interplane struts is streamline wire. The ailerons extend the full span of the top plane only and have steel tube spars or torque tubes, terminating at the inner end in cranks by means of which they are operated via the sloping tubes previously referred to. The trailing edge of the lower plane is a separate unit, and has a steel tube spar similar to that of the ailerons. The trailing portion of the lower wing is not, however, used as ailerons, the arrangement being merely incorporated in order to reduce the folded width of the machine by permitting the bottom plane trailing edge to be hinged down for folding. With the wings folded, the overall folded width is but 7 ft. 11 in. The incidence of the tail plane is adjustable while the machine is on the ground, but there is no tail trimming gear for use in the air.



View from above into cockpit of "Elf," showing lower end of joystick and aileron cranks. ("FLIGHT" *Sketch.*)

The undercarriage of the "Elf" is of the "split" type, with the inner ends of the bent axles hinged to a small *cabane* below the fuselage floor. Normally the telescopic legs are of the compression rubber block type, but if desired a double-acting oleo leg can be fitted at extra cost. The tail skid is a leaf spring clamped to the underside of the fuselage. It is provided with a quickly replaceable cast-iron shoe.

As already mentioned, the power plant chosen for the Parnall "Elf" is the new A.D.C. "Hermes" engine. This is mounted on a welded steel tube structure in the nose of the fuselage, the mounting being a detachable unit attached by four bolts to the fuselage proper, from which it is separated by a fireproof bulkhead. The cowling, of sheet aluminium, almost entirely encloses the engine, with the exception of a narrow slit in front and some louvres for the escape of the air. Deflector plates are fitted inside the cowling to direct the air flow on to the cylinder heads. The petrol system is of the engine-driven pump type, the pump keeping the fuel constantly supplied to a small gravity tank in the top centre section. This tank has a capacity of 3 gallons, while the main petrol tank, mounted in the fuselage, has a capacity of 20 gallons.

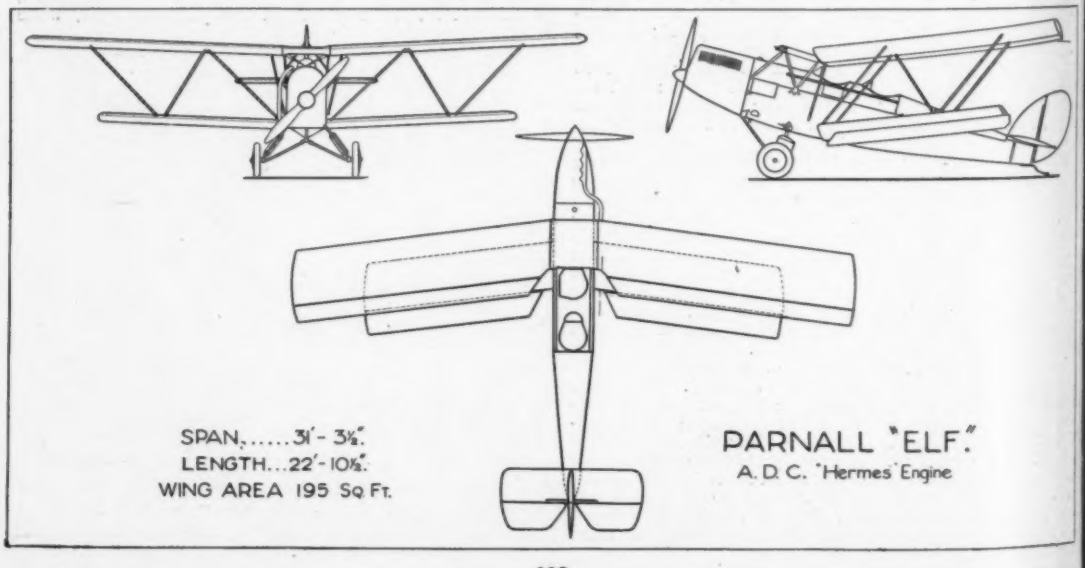


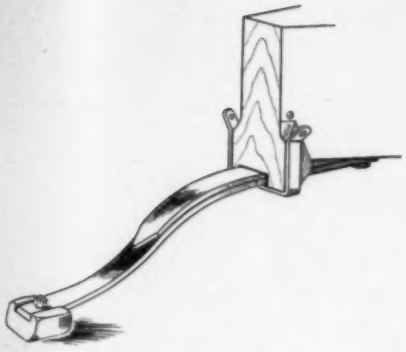
The ailerons in the "Elf" are operated by crank levers and external tubes, the flaps having torque tubes and cranks. ("FLIGHT" *Sketches.*)

The main dimensions of the Parnall "Elf" are:—Length overall, 22 ft. 10½ in.; wing span, 31 ft. 3½ in.; wing area 195 sq. ft.; width, folded, 7 ft. 11 in.; height, 8 ft. 6 in. wheel track, 5 ft. 6 in.

The tare weight is 900 lbs., and the "Aerobatics" Certificate of Airworthiness covers a gross weight of 1,500 lbs. so that the disposable load may be at least 600 lbs. This leaves a good margin for luggage, &c.

The "Elf" having but recently been completed, actual performance figures are not yet available, but following is



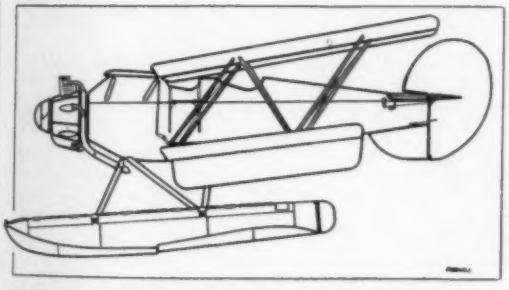


The tail skid of the Parnall "Elf" is a laminated steel spring with replaceable cast-iron shoe. ("FLIGHT" *Sketch.*)

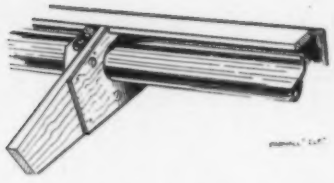
the *estimated* performance:—Full speed at ground level, 116 m.p.h.; at 5,000 ft., 112 m.p.h.; cruising speed, 103 m.p.h.; stalling speed, 40 m.p.h. The ground rate of climb is 800 ft./min., and the ceiling 16,000 ft. The range is approximately 400 miles.

If desired the Parnall "Elf" can be fitted with a twin-float undercarriage, when it should be a very useful seaplane.

The Parnall "Peto" is a two-seater reconnaissance biplane designed for service use in conjunction with submarines. It is of composite construction, the metal work being chiefly stainless steel or duralumin. The limitations on space for stowage on board a submarine called for considerable ingenuity in design to meet service requirements



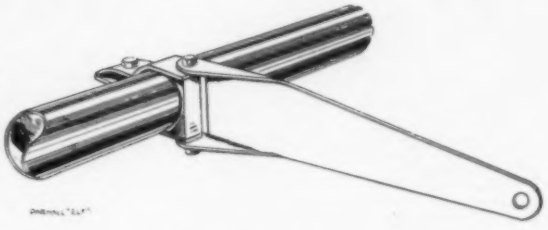
Side elevation of "Peto" with wings folded.



Attachment of wood ribs to torque tube in "Elf" ailerons. ("FLIGHT" *Sketch.*)

and at the same time produce an aircraft that was seaworthy and had a useful air performance. The "Peto" can be launched from or stowed in its base in an exceedingly short time. Provision is made for catapult starting.

The fuselage is of rectangular form, with spruce longerons and spruce or stainless steel struts. The rounded deck



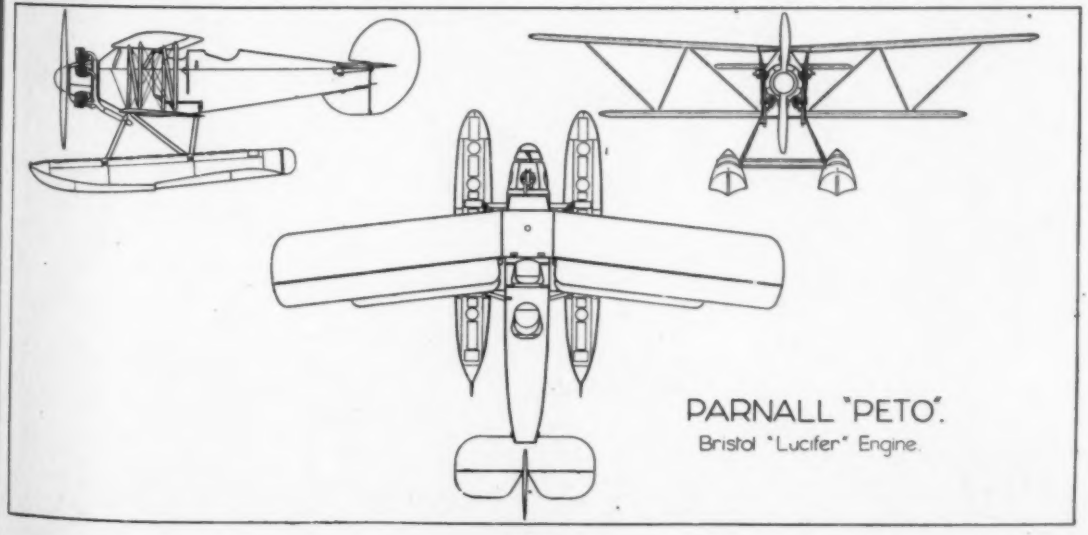
A hinged lever, normally folded flat against the spar, holds the folded "Elf" wing in place against the fuselage. ("FLIGHT" *Sketch.*)

fairing meets the underside of the centre-section. The fuselage is fabric covered except the sides of the front cockpit, where quickly-detachable aluminium panels are used.

The biplane wings have spars and ribs of spruce, while the centre section and aileron spars are steel tubes. The top planes have ailerons extending the whole span, while the lower plane trailing edge is hinged for wing-folding purposes.

A braced monoplane type of tail is used, of composite construction and fabric covered. The fin is underslung, the rear spar to which the rudder is hinged being attached to the top and bottom longerons. The tail plane has provision for trimming during flight.

Of the twin-float type, the undercarriage has streamline struts of N-formation in side elevation, braced with cables in front and rear panels. Long single-step duralumin floats are



carried cantilever fashion on front and rear booms, and can be readily removed without interfering with the bracing.

The engine is an Armstrong-Siddeley "Mongoose," supported on a simple girder-type plate attached to the fuselage by steel tubes. A hand-starting gear is fitted in the passenger's cockpit. The engine cowling is quickly detachable, and a 14·5-gallon petrol gravity tank is fitted inside the fuselage, the 1½-gallon oil tank being placed immediately below it.

Tandem cockpit arrangement is provided, both cockpits being aft of the top centre-section. They are fitted with seat pans capable of taking parachutes or air cushions. The observer is provided with a chart case, observation instruments and a short-wave wireless transmitting and receiving set. The pilot's cockpit contains the standard joystick controls and service equipment.

Following are the main dimensions of the Parnall "Peto": Length, 22 ft. 6¼ in.; span top plane, 28 ft. 5 in.; span bottom plane, 20 ft. 5 in.; width, folded, 8 ft.; height, 8 ft. 11 in.; track over float centres, 6 ft. ½ in.

The tare weight is 1,300 lbs. and the loaded weight, 1,950 lbs., giving a wing loading of 11·4 lbs./sq. ft. and a power loading of 12·65 lbs./h.p.

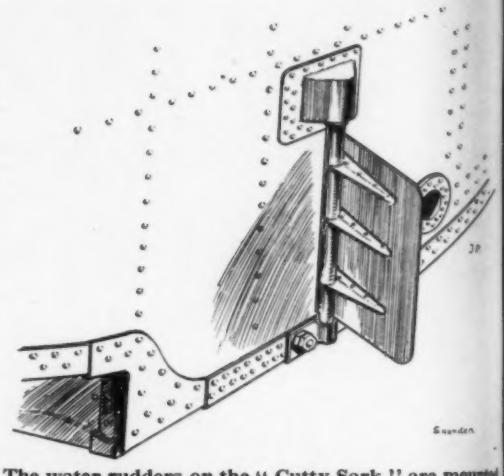
The performance of the "Peto" is: Full speed at sea level 113 m.p.h.; at 5,000 ft., 107 m.p.h. Rate of climb at sea level, 600 ft./min. Climb to 5,000 ft. in 11 mins. Endurance 2 hours.

S. E. SAUNDERS, LTD.

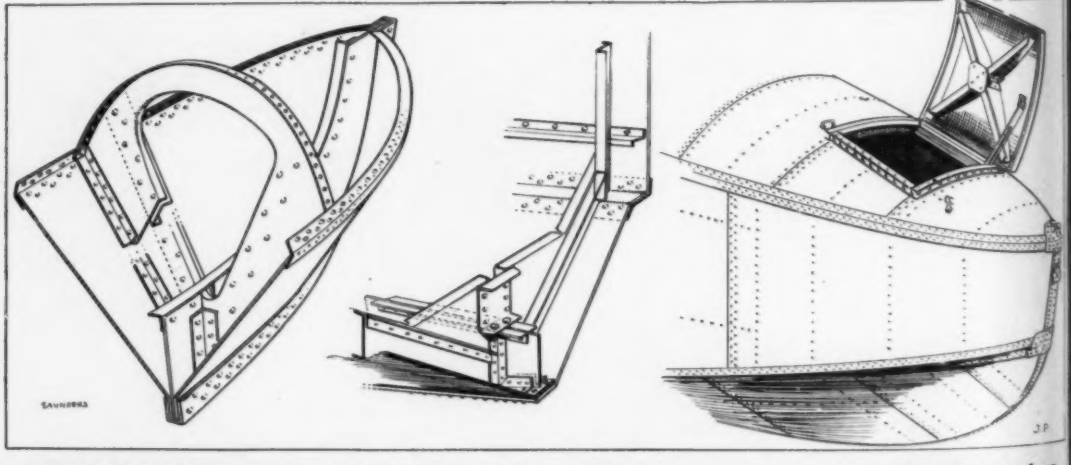
THE firm of S. E. Saunders is known throughout the world as pioneers of high-speed surface vessels, while the experience of the firm in marine aircraft goes back to 1912. Recently, Sir A. V. Roe and Mr. John Lord became financially interested in the company, and a vigorous policy was at once laid down, one of the first results of which is the little four-seater flying-boat, which is to be exhibited at Olympia.

The "Cutty Sark," as the Saunders' four-seater flying-boat has been christened, is a more than usually interesting machine, not only because it represents a type of aircraft likely to become extremely popular during the next few years, but also because it combines what may be termed the two extremes in aircraft construction: all-metal and all-wood. The flying-boat hull is built entirely of Duralumin, or rather "Alclad," while the wing is a wooden structure, with three-ply wood skin or planking. This form of wing construction has been used by Fokker for years, and has been proved satisfactory, both for cheap production and for durability with but little attention.

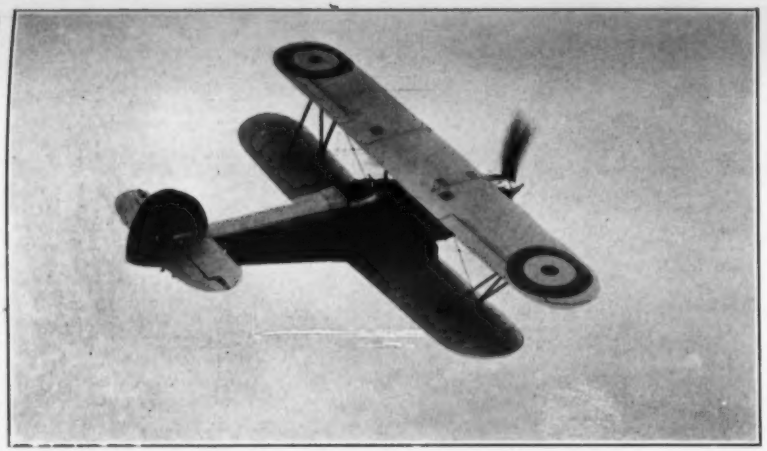
The boat hull of the Saunders' "Cutty Sark" is of a type developed by this firm during the last few years, and is claimed to possess remarkably low water resistance. It differs from the hulls of larger flying-boats, in that it has but a single step, situated a short distance aft of the centre of gravity of the machine. The Vee bottom extends aft of the step, and at the sternpost the keel sweeps down slightly. Constructionally, the hull consists of frames of "Z" section, to which the planking plates are riveted. The use of "Z" sections in the frames greatly facilitates riveting, as the riveting tools can be brought against the rivets at right angles to the frame flanges. Approximately half-way between keel and chines runs, on each side, a deep fore and aft member or stringer, which is so arranged that it transmits the loads from the planing bottom to the gunwales, and thereby to the whole hull. This form of construction is not only cheap, but should be very strong. It avoids the need for panel beating, always rather a costly and laborious process, and in the "Cutty Sark" the only parts requiring this treatment are the



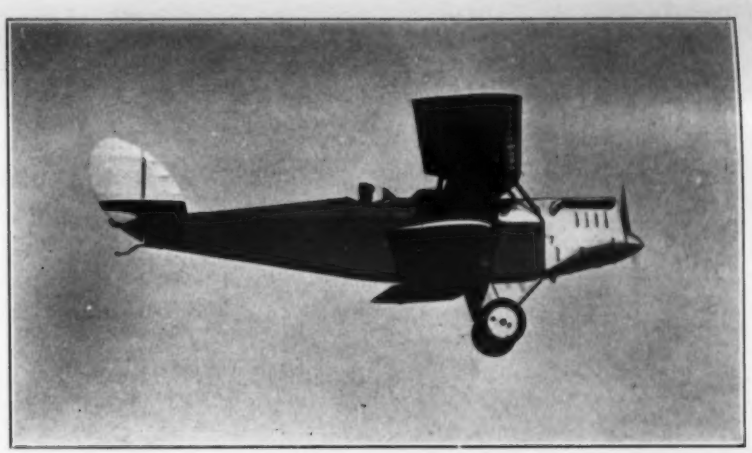
The water rudders on the "Cutty Sark" are mounted on the sides of the hull, and when operated together, form useful brakes. ("FLIGHT" *Sketch.*)



Details of the hull construction of the Saunders' "Cutty Sark." On the left a wing float, and on the right is shown the bows, with fore hatch open. ("FLIGHT" *Sketches.*)



HAWKER "HORNET" (Rolls-Royce "F"). ("FLIGHT" *Photo.*)



PARNALL "ELF" (A.D.C. "Hermes"). ("FLIGHT" *Photo.*)

PARNALL "PETO" (A.S. "Mongoose").

SAUNDERS "CUTTY SARK" (2 A.D.C. "Hermes"). ("FLIGHT" *Photo.*)

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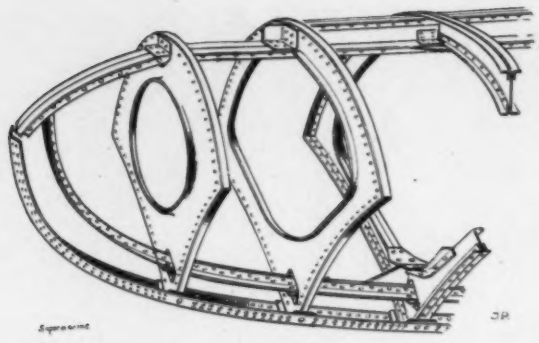


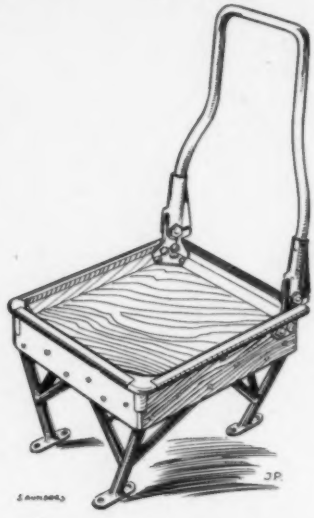
Wing float construction of Supermarine "Southampton." The misplacing of this block was discovered too late to be rectified. ("FLIGHT" *Sketch.*)

chines and one or two plates in the extreme bows of the hull. Model tests in the tank have indicated that the hull shape is to be regarded as good, so that it would appear that we have here a form of construction which combines cheapness with hydrodynamic efficiency.

The cabin of the "Cutty Sark" is exceptionally roomy, and as it has windows on all but the aft side, it is unusually light and airy in appearance. The side windows are made to open, as is also the starboard half of the roof window, and a triangular window above the instrument board. Thus, ventilation should present no problems, while the triangular window should enable the pilot to pick up his moorings without going forward in the hull, where a mooring hatch is provided. The four seats are very comfortable, and the cabin gives ample room for legs and elbows, so that even on very long flights the occupants are unlikely to suffer any undue fatigue. The cabin is ahead of the wing and engines and thus not in the slipstream, and, consequently, but little should be heard of the engine noise. In this respect, the "Cutty Sark" comes nearer to the comfort of the "pusher" machines of the old days than anything we have seen, and with the added protection of a cabin. In fact, it would be almost impossible to imagine a lay-out more likely to give a maximum of comfort.

The pilot's seat is the port forward one, and beside it is a seat for another pilot, or for a passenger, dual controls being provided. When not needed, the starboard controls can be removed. This arrangement has much to recommend it, not least its obvious suitability for instructional work, and as the time is undoubtedly coming when the flying-boat will be extensively used on our long Empire air routes, it would appear that among its other uses the "Cutty Sark" might form a very excellent training and practice machine for seaplane pilots. The fact that the machine is fitted with two engines would reasonably simulate conditions on a larger flying-boat.

The one-piece monoplane wing rests direct on the gunwales of the boat hull, and the two A.D.C. "Hermes" engines are mounted on steel struts above the wing, each engine being a readily detachable unit with its mounting. The main petrol tanks are housed inside the wing, and in the fairing behind each engine is a small gravity tank, separated from the engine by a fireproof baffle. As the crew can walk on the wing, the engines are remarkably accessible.

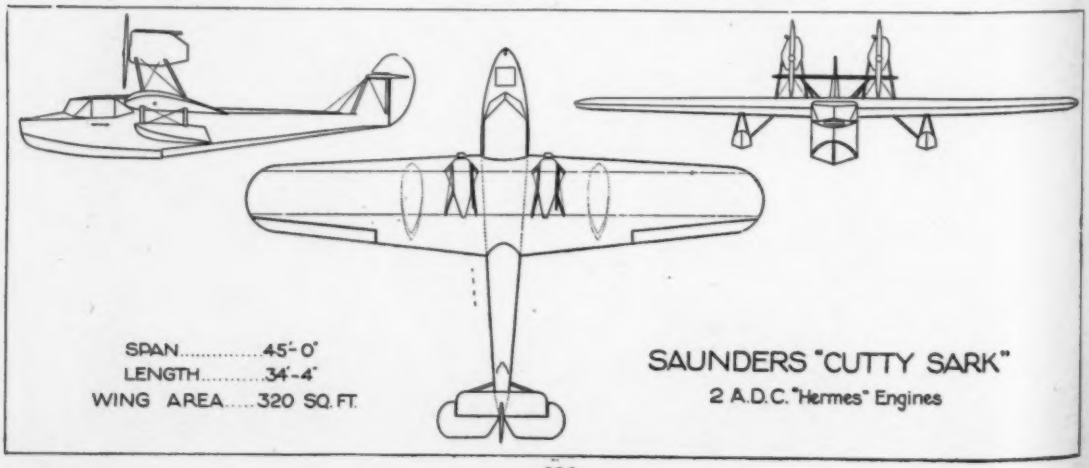


One of the seats, with hinged back framework, of the Saunders "Cutty Sark." ("FLIGHT" *Sketch.*)

Lateral stability on the water is obtained by two outboard floats of large volume, and it is of interest to note that should the main hull spring a leak and become partly flooded, the machine would probably sit nearly upright on the water, supported by these two floats. While, in case of total flooding of the main hull, the wooden wing has been made watertight (and divided into a large number of compartments), and would support the machine for a very long period. Thus, the "Cutty Sark" should be one of the safest aircraft imaginable.

The space inside the hull is unobstructed, and a large quantity of luggage or mails can readily be stowed away there. One could suggest dozens of uses to which a machine of this type could be put, but space forbids. As a really comfortable "air yacht," the "Cutty Sark" would be difficult to beat, while for passenger work on a small scale, seaside joy riding, and as already mentioned, training of seaplane pilots for larger flying-boats, the machine appears to have obvious claims to attention.

The main dimensions and areas of the "Cutty Sark" are as follows:—Length, overall, 34 ft. 4 in.; wing span, 45 ft.;



overall height, 11 ft. 2 in.; wing area, 320 sq. ft.; area of tail plane and elevator, 36 sq. ft.; area of fin and rudder, 20 sq. ft.

The show machine will be fitted with two A.D.C. "Hermes" engines, but it is pointed out that, within reason, any engines giving a total of about 200 h.p. may be used. For instance, should three engines be preferred, one presumes that the A.B.C. "Hornet," or the Pobjoy types, would be suitable.

Fitted with the "Hermes" engines, the "Cutty Sark" has a tare weight of 2,375 lbs., and a permissible gross weight within the C. of A. of 3,500 lbs. The normal weight of fuel and oil (for 4 hrs.) is 365 lbs., leaving a normal weight of pilot, passengers and luggage, of 760 lbs. Assuming that the pilot weighs 160 lbs., the pay load is 600 lbs., or nearly 3 lbs./h.p. Looked at in another way, the expenditure of power is 70 h.p. per *paying* passenger, or 52·5 h.p. per occupant. The estimated top speed is 105 m.p.h., and the cruising speed 85 m.p.h.

SHORT BROTHERS, LIMITED

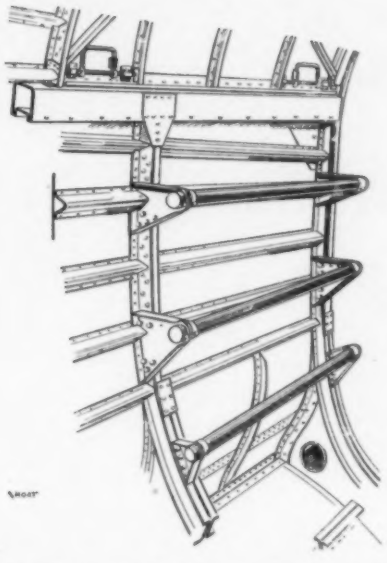
THREE complete machines will be exhibited on the stand of Short Brothers, of which, however, but two will be Short machines, the third being a de Havilland "Gipsy-Moth," for which Short Brothers have designed an amphibian undercarriage. The two Short machines will be the "Singapore I" on which Sir Alan Cobham made his flight to the Cape and back, and the second will be a Short "Mussel" light seaplane.

The "Singapore I" as exhibited at Olympia will be somewhat modified as compared with the machine in its original form. To begin with, the hull has been slightly lengthened, while Rolls-Royce H.10 engines have been fitted in place of the "Condors" of the original machine. Handley Page automatic wing tip slots have also been added. The fitting of the H.10 engines will result in an improved performance both in top speed and, particularly, in getting off. At the same time, the modified "Singapore I" will get off with an overload gross weight of 27,000 lbs. as compared with the corresponding figure of 25,000 to 26,000 lbs., which was the overload gross weight of the machine in its original form.

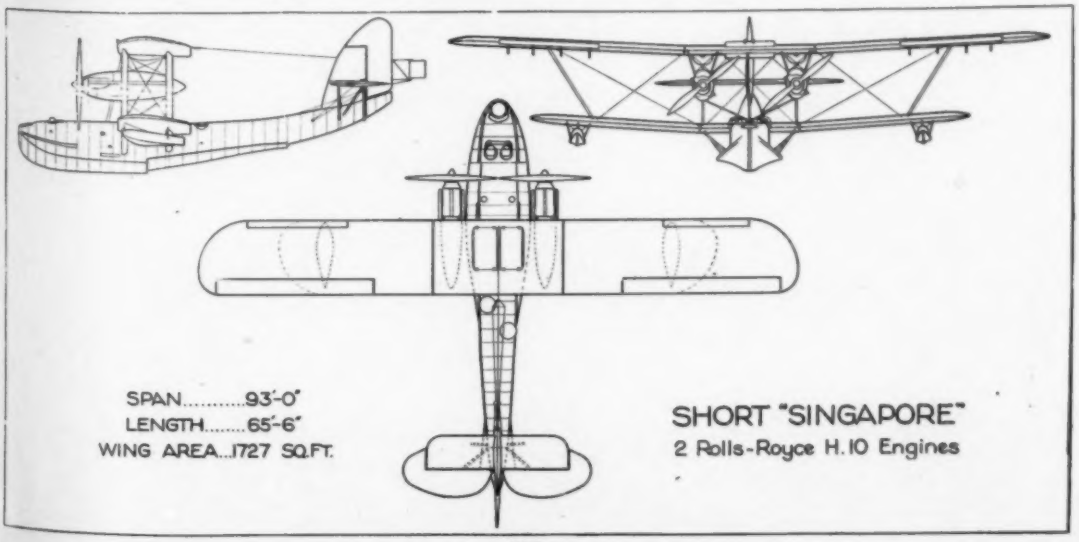
Constructionally, the hull of the modified "Singapore Mark I" follows usual Short practice, in which the frames are of L-section duralumin, to which the outer skin is riveted, reinforced by short fore-and-aft stringers interrupted at the frames. With this form of construction the outer skin provides all the longitudinal stiffness. In the Short system no packing is used in the riveted joints between the plates of the skin. Repairs can easily be carried out by riveting patches of duralumin over any damaged part.

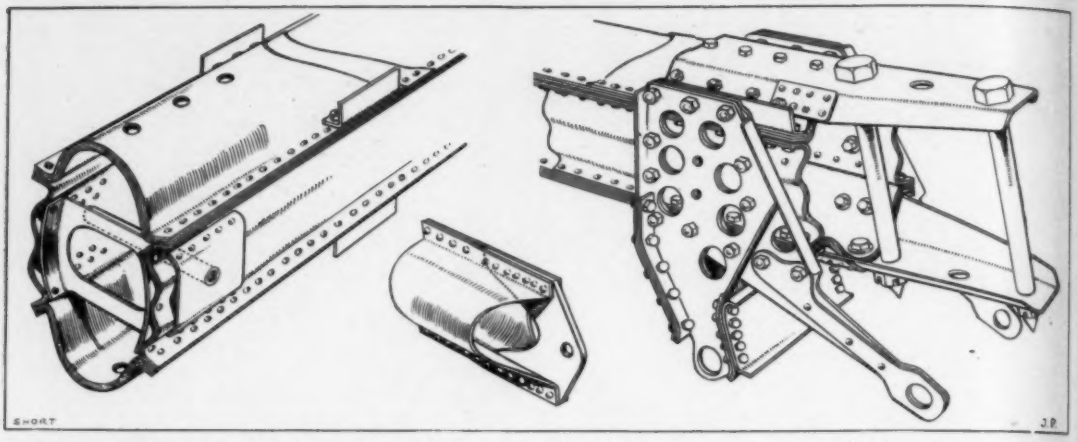
The wing structure is also entirely of duralumin, with the exception of a certain number of steel fittings. The main spars are of the box type, with duralumin flanges and webs corrugated for stiffness. The spars are produced by pressing long lengths of duralumin strip to the desired contour, instead of by rolling or drawing, as is more usually done. The ribs are girders of duralumin tube. The main spars have their flanges laminated, many thicknesses being used where the loads are heavy, thus obtaining an economic use of the spar material. "Frise" ailerons are fitted to the top plane only.

The two Rolls-Royce type H.10 engines are housed in streamline nacelles fitted midway between top and bottom planes. The radiators, which were formerly placed in the nose of the nacelles, have been replaced by long tube radiators placed under the top plane, above the engines. Shutters are provided for varying the cooling. The nacelles themselves are of monocoque construction (metal). Oil tanks are fitted



The Short "Singapore" hull construction uses channel and L-section frames. The longitudinal stringers are interrupted at the frames. ("FLIGHT" *Sketch.*)





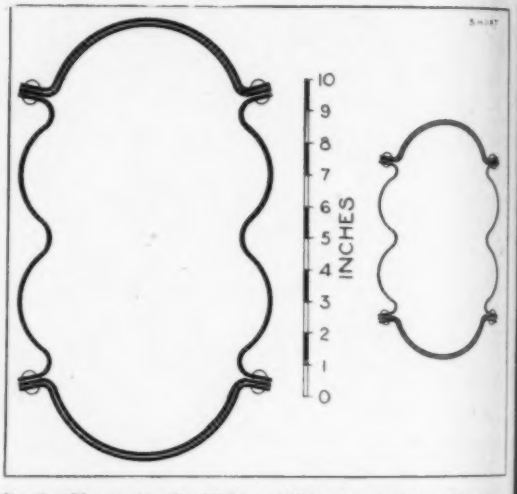
ON THE SHORT "SINGAPORE": Details of the duralumin box spars, strut fittings and a strut end. Note laminated spar flanges. ("FLIGHT" *Sketches.*)

in the nacelles and are connected to external oil coolers. Hand starting gear is provided for the engines.

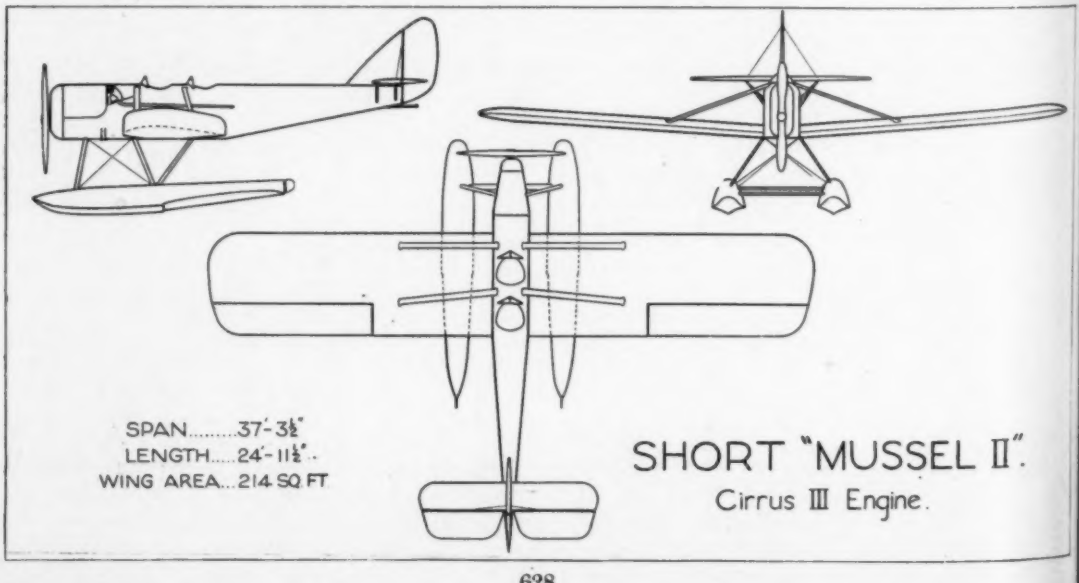
A petrol supply of the direct gravity feed type is installed, the two tanks being located in the upper plane. The system is so arranged that either or both engines can be fed from either or both tanks. Should the machine be required for long reconnaissance patrol duties extra tanks can be fitted on top of the hull. The weight of these tanks and their petrol represents an overload.

At Olympia the Short "Singapore I" will be exhibited, not with the internal arrangements used on Sir Alan Cobham's flight, but as arranged for service operations. The front gunner is situated in the bows, where is fitted a Lewis gun on a Scarff ring. This gunner, being also responsible for the bombing, is provided with bomb sight and releasing gear.

The pilot and navigator have their cockpit between the forward cockpit and the wings. This cockpit is equipped with dual controls, and the seats, which will accommodate Irving parachutes, can be rotated about their axes to facilitate getting in or out. Inside the hull there is accommodation for the navigator and wireless operator, with a chart table fitted with drawers for the stowage of instruments, etc. Engine instruments are mounted on the front spar frame, the engineer being provided with a seat close to this instrument board. Aft of the rear spar frame are fitted two Scarff rings for Lewis guns. These gun rings are staggered on each side of the centre line to give a good angle of fire in all directions. All gun rings are so arranged as to give a



On the Short stand will be exhibited a portion of a spar for a new large three-engined monoplane. The new spar compared with that of the "Singapore."



field of fire vertically downwards, which improves the ability of self-defence.

Following are the main dimensions of the modified Short "Singapore Mark I": Length o.a., 65 ft. 6 in.; wing span, 93 ft.; wing chord, 11 ft. 6 in.; wing area, 1,727 sq. ft.

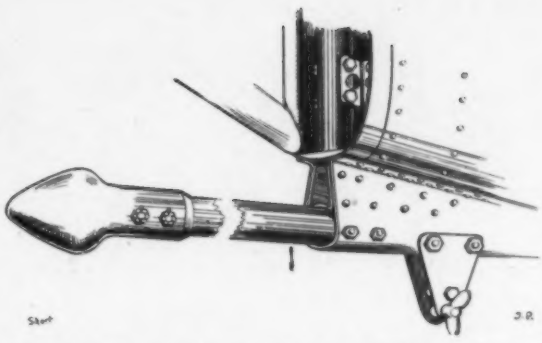
With a tare weight of 12,955 lbs. the "Singapore I" has a disposable load of 7,045 lbs., giving a normal gross weight of 20,000 lbs. The disposable load may be divided up as follows: Military load (including crew of 5), 2,115 lbs.; 610 gallons of petrol, 4,570 lbs.; 36 gallons of oil, 360 lbs. Total load, 7,045 lbs.

The performances of the "Singapore Mark I" are: Full speed at sea level, 128 m.p.h.; minimum speed, 60 m.p.h.; initial rate of climb, 890 ft./min.; service ceiling, 15,500 ft. Time to 10,000 ft., 17 mins.; time to take-off, 16 secs. Range at most economical speed, 900 miles with normal fuel capacity.

The Short "Mussel II" is a light two-seater seaplane, with "Cirrus III" engine. It is of all-metal construction, with the exception of the wing covering, which is of fabric. This machine is an improved version of the "Mussel I," which was in commission for two years during which time it did some 120 hrs.' flying, and was moored out in the Medway for months at a time. The "Mussel" is a tractor low-wing monoplane with twin-float seaplane undercarriage.

The fuselage is a duralumin shell of oval cross-section, and is, in principle, of similar construction to that of the hull of the "Singapore." The fuselage is, in effect, a tapered tube of metal, and its torsional strength and rigidity is extremely great. At the front end, the fuselage terminates in a fireproof bulkhead. The cockpits are arranged in tandem in the usual manner.

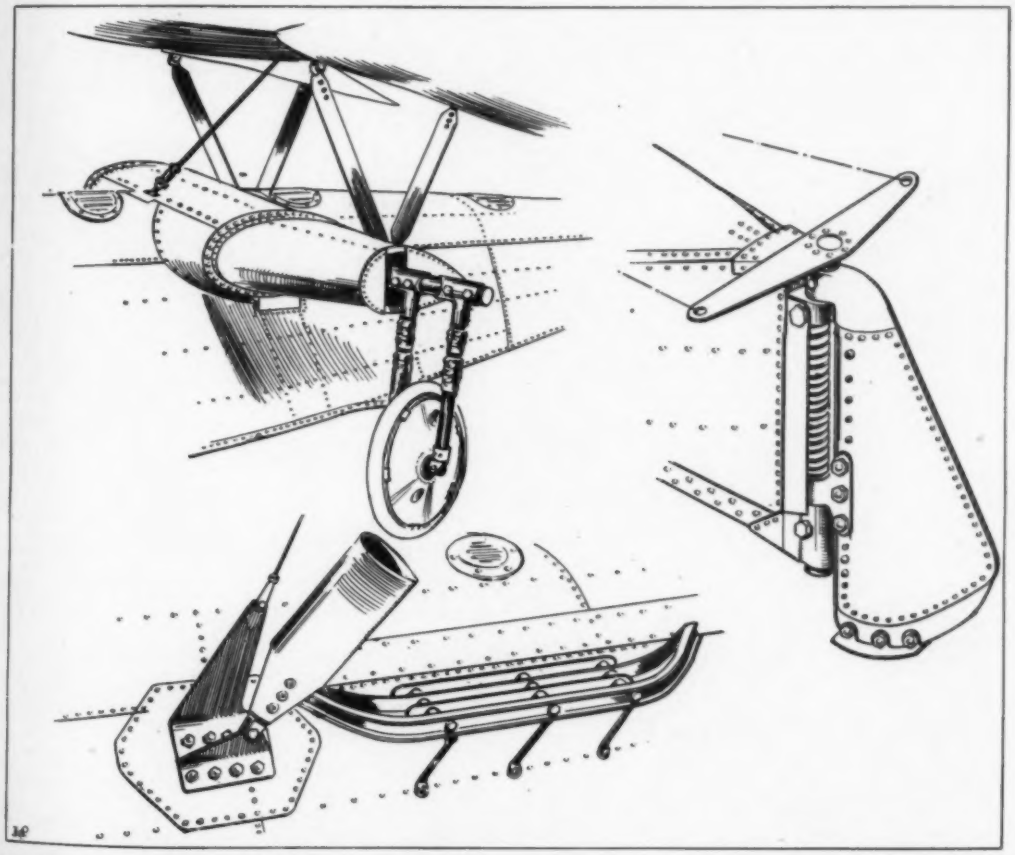
The monoplane wing is built in two halves, each of which is attached to wing roots in the fuselage by gimbal joints, and braced by struts above the wing. The main spars are of built-up box formation, of duralumin, and the ribs are



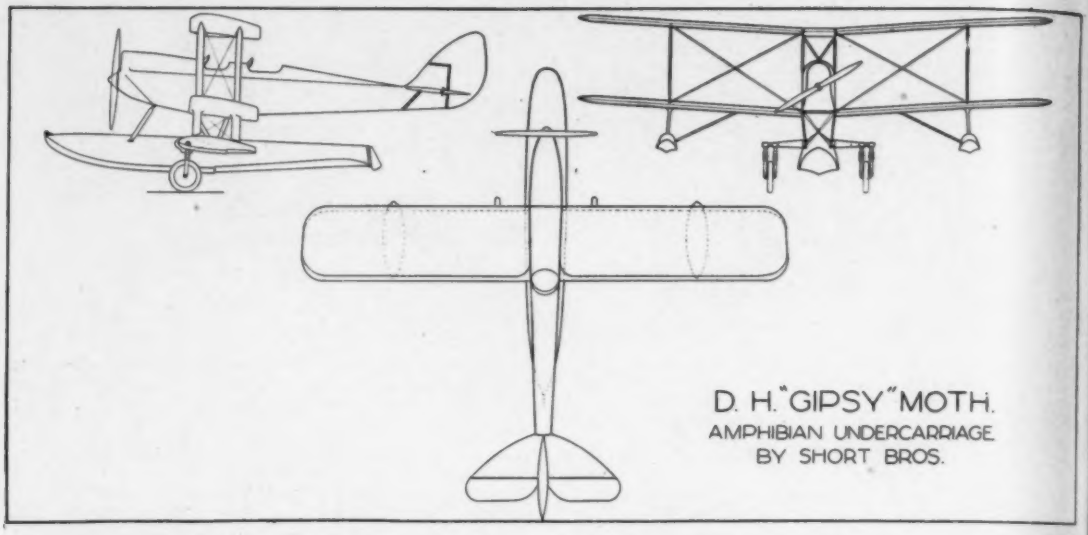
The tail skid on the Short "Mussel" is unusual. The fitting below the stern is used for carrying ballast when the machine is flown solo. ("FLIGHT" *Sketch.*)

girders of duralumin tubing. The spars have proved extremely stiff under load, in spite of the absence of internal diaphragms, and the corrugated flanges have enabled a maximum stress of 22 tons per sq. in., and a stress of 16·6 tons per sq. in. at the lip, to be developed under combined bending and end load.

Duralumin floats of Short design and construction support the "Mussel II" on the water, although, if desired, the machine can also be supplied as a landplane, the two undercarriages being interchangeable. As a result of extensive tests carried out in the experimental water tank of Short Brothers, it has been possible to produce a float of very



AN AMPHIBIAN "GIPSY MOTH": Details of the undercarriage produced by Short Brothers. The wheels are raised by rotating the large cross tube. Note also water rudder, which acts as a tail skid when using machine on land. ("FLIGHT" *Sketches.*)



efficient design, giving excellent all-round results. Characteristic features are: very clean running and low water resistance. The special shape of the float bottom also reduces shock on alighting, while not interfering with the ability to "unstick." The floats are constructed of duralumin sheets riveted to transverse frames, the skin being stiffened by intercostal channel stiffeners. Bulkheads are fitted in the float, forming a number of watertight compartments. Water rudders are fitted to the heels of the floats, connected to the rudder bar.

The Mark III "Cirrus" engine is mounted on four brackets of special design, the brackets being secured between specially strong transverse frames built into the nose portion of the fuselage. Modified engine feet are fitted, so designed that they fit into rubber blocks fitted into the engine brackets, so that the engine is virtually mounted on rubber. A long lever, not dissimilar to a joy stick, is fitted in the pilot's cockpit, and is connected up, by means of a cable, with the engine starting mechanism. The main petrol tank is situated immediately behind the fireproof bulkhead, the feed being entirely by gravity. A direct-reading petrol gauge is fitted in the petrol tank, and is visible from both cockpits.

Overall dimensions of the Short "Mussel II" are: Length, 25 ft.; wing span, 37 ft. 3½ in.; wing chord, 6 ft. 3 in.; total wing area, 214 sq. ft.

The tare weight is 1,061 lbs. and the gross weight, 1,640 lbs. The load may be made up as follows: Crew of 2—320 lbs.; instruments, 10 lbs.; 14·75 gallons of petrol, 112 lbs.; 1·5 gallons of oil, 15 lbs.; luggage and miscellaneous load, 122 lbs. Wing loading, 7·67 lb./sq. ft. Power loading, 17·25 lbs./h.p.

The *estimated* performance is as follows: Full speed at sea level, 102 m.p.h.; landing speed, 48 m.p.h. Initial rate of climb, 620 ft./min. Endurance at cruising speed, 4 hours.

Reference has been made to the fact that on the Short stand there will be exhibited a "Gipsy-Moth" with amphibian undercarriage. This machine is the property of Mr. John Scott Taggart, of radio fame. Short Brothers have designed for him an amphibian undercarriage, which consists of a single float placed centrally under the fuselage, two wing tip floats, and a retractable land undercarriage. The main and wing tip floats are of normal Short design and construction, with duralumin as the material.

The landplane undercarriage consists of a large-diameter transverse tube carried in bearings inside the central float and having on it, near the centre, a worm wheel. A worm on a sloping shaft which reaches into the pilot's cockpit and there terminates in a crank handle engages with this worm wheel, and rotates the horizontal tubular shaft. At each end of the transverse tube is a steel tubular fork, both members of which are telescopic and carry the wheel. When the transverse shaft is rotated the forks move forward and up until the wheels are clear of the water. The transverse tube itself is a cantilever beam, and may also have to resist a fair amount of torsion under certain conditions of landing or taking off. It has, however, been found that the tube stands up to the work quite well, and the amphibian undercarriage, although adding a certain amount of weight, increases enormously the choice of landing "grounds" available.

The central single-float arrangement has not been tried to any great extent in this country, but in the United States of America it is preferred to the British twin-float system. The lateral stability at rest is established, as in a flying-boat, by the outboard floats, and we understand that during tests from the Medway, at Rochester, the amphibian "Moth" was found to handle well on the water. A water rudder is fitted to the heel of the central float, and when the machine is used as a landplane the rudder, which is sprung, serves as a tail skid, the normal tail skid of the "Moth" not coming in contact with the ground.

In addition to complete aircraft, Short Brothers will exhibit various components, etc. Among these will be one of the special type of chairs used in the Short "Calcutta" passenger flying-boats now being operated in the Mediterranean by Imperial Airways, Ltd. The air cushions of these chairs are detachable and serve, when removed from the chair, as lifebelts.

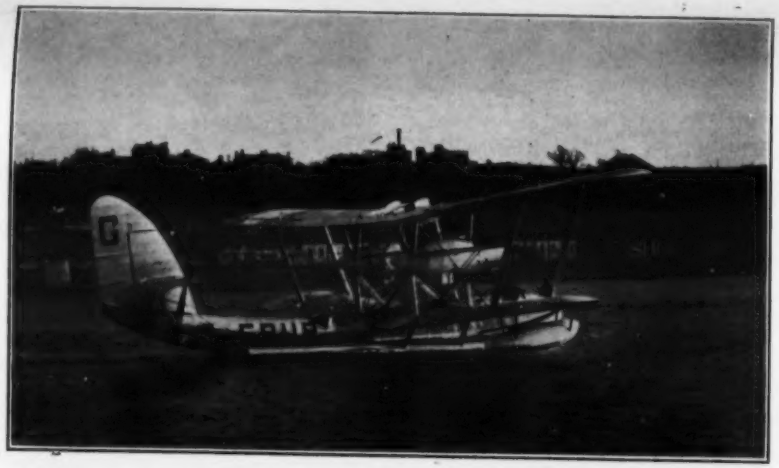
A main wing spar, in duralumin, for a new three-engined twin-hull flying-boat now being built by Short Brothers, will also be exhibited. This spar is of the same general type as those used in the "Singapore" and "Calcutta" flying-boats, but is much larger.

Finally there will be on view on this stand a pair of duralumin floats suitable for a machine of some 5,000 lbs. weight.

SIMMONDS AIRCRAFT, LIMITED

ALTHOUGH established less than a year ago, this firm has already attained a position of importance in the British aircraft industry, at least as far as civil aircraft is concerned, and more particularly aircraft for private use, training and similar functions. In this respect Mr. O. E. Simmonds, the founder and technical director of the firm, has established what is undoubtedly a record in that, in spite of the short period of its existence, the firm already has its standard type of machine in quantity production, while at least two variations or sub-types are about to become standardised. And it is significant that to all intents and purposes the production type of machine is identical with the original "prototype."

The question that will naturally be asked is why this instant success has been attained. The reply, briefly, is that, in addition to possessing flying qualities equal to those of other two-seater light aeroplanes, the Simmonds "Spartan" possesses features never hitherto incorporated in any aero-



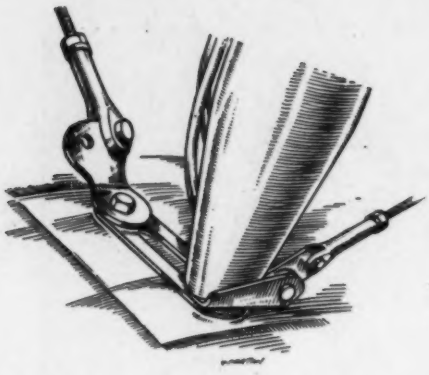
SHORT "SINGAPORE I" (2 Rolls-Royce "H.10"). ("FLIGHT" *Photo.*)

SHORT "MUSSEL II" ("Cirrus III").

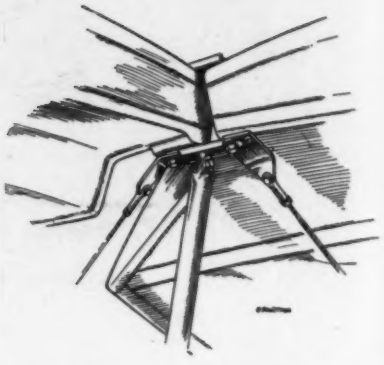
AMPHIBIAN GIPSY MOTH ("Gipsy"). ("FLIGHT" *Photo.*)

SIMMONDS 2-SEATER "SPARTAN" ("Cirrus III"). ("FLIGHT" *Photo.*)

AT OLYMPIA



The interplane strut fittings on the Simmonds "Spartan" are all of one type, and can be used in all the various positions. ("FLIGHT" *Sketch.*)



The hinge on the top rear spar, jury strut and fittings on the "Spartan." ("FLIGHT" *Sketch.*)

plane in this or any other country. Mr. O. E. Simmonds was the first designer to realise that the normal aeroplane, evolved from generations of types so to speak, requires a number of spares out of all proportion to the structural necessities of the machine. He reasoned something like this: The motor car of to-day does not, for example, require to carry four spare wheels. Then why should an aircraft—a biplane—need four separate and distinct spare wings; a top starboard plane, a bottom starboard plane, a top port plane and a bottom port plane? That, we think, was how the fundamental idea underlying the design of the "Spartan" first took form. Later on the same principle and the same line of argument was followed to its logical conclusion, and the modern "Spartan" requires rather less than half a dozen spare components!

Beginning with the wings, Mr. Simmonds solved the fundamentals of the problem by making use of a symmetrical biconvex wing section. Obviously such a section is exactly alike whether placed the "right way up" or "upside down." Needless to say, however, the problem was not as simple as that. There was still the question of suitable wing fittings which would allow one spare wing to be used in any of four positions: starboard top or bottom, port top or bottom. After studying the problems for a time, Mr. Simmonds evolved a set of wing fittings which would accomplish this. More than that, he managed so to arrange his biplane cellule that the inter-plane struts in front and rear bay are the same; the lift wires in both bays are the same, and so forth. So far, the incidence bracing wires have defeated him, but here it is a question of either having two standard lengths of incidence wires or one length and some form of an adaptor. Of the two alternatives the two lengths of incidence wires was preferred.

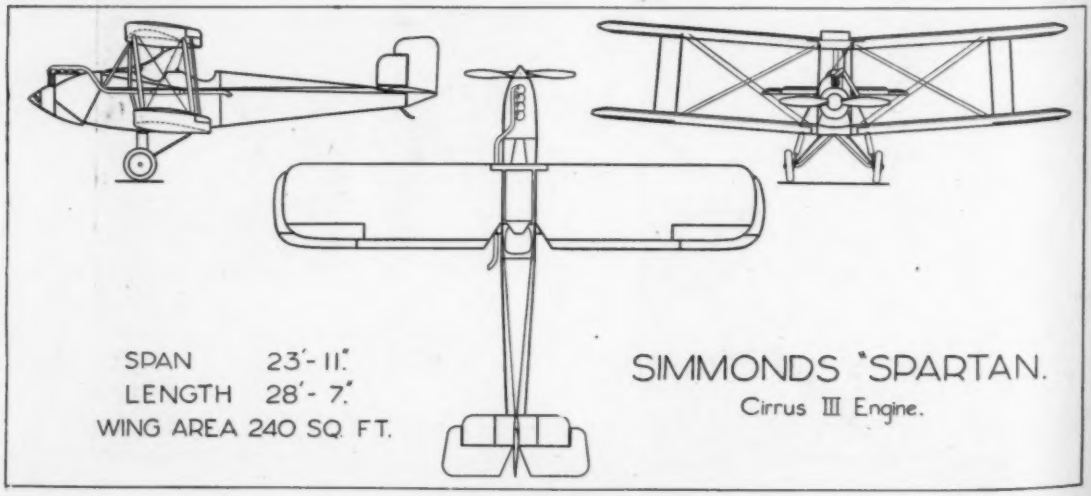
Having succeeded in reducing the number of spares for the wings, Mr. Simmonds turned his attention to the rest of the machine. In the tail, for example, one component is standardised to serve as the vertical fin or as one end piece of the tail plane. The elevator flap, symmetrical in section like the main wings, can be used not only on port or starboard side, but is identical with the rudder as well.

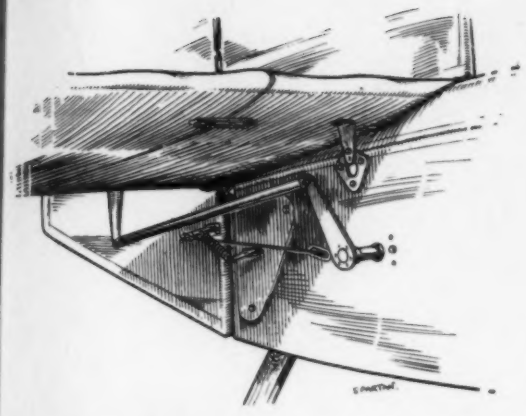
There still remained the undercarriage. Choosing the "split" type, one wheel, with its tripod support, is made to serve for either port or starboard side, so that the agent stocking "Spartan" parts need keep in stock one-half of an undercarriage only.

It might be argued that if a private owner of an aeroplane makes a bad landing and has to write to the makers for a new starboard bottom plane, for example, it matters little whether that plane is identical with the other three planes on the machine. While that is more or less true to-day, it should be remembered that very shortly there will be agents all over the country who stock light 'plane spares, and when that time comes, the advantage of having to carry but a few spares will be obvious. Moreover, in the case where one firm or company standardises one type of machine (National Flying Services have recently standardised two types, of which one is the "Spartan") it will quite evidently simplify matters if the number of necessary spares is small So that the advantages of the Simmonds system of interchangeable parts is likely to increase as time goes on.

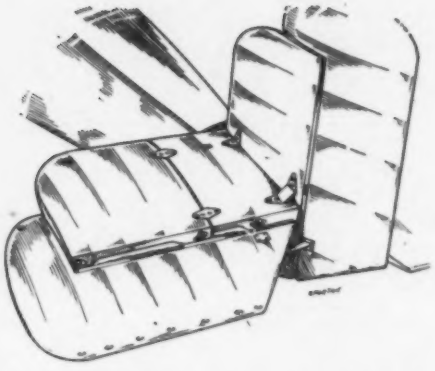
We have dealt at some length with this feature of interchangeability because we believe that the extent to which it has been carried in the Simmonds "Spartan" is still not fully realised generally. And with that we may turn to a description of the actual types to be exhibited at Olympia.

As the standard "Spartan" is the basis, so to speak, of all





The " Spartan " elevator is operated from a lay shaft via external cranks and push-pull tube. (" FLIGHT " *Sketch.*)



In the " Spartan " tail the outer ends of the tail plane are identical with the fin, and each elevator flap is interchangeable with the rudder. (" FLIGHT " *Sketch.*)

the Simmonds types, this will be dealt with first. It is a two-seater biplane fitted normally with the " Cirrus III " engine, which develops 95 h.p. The fuselage is of the " box " type, with a light internal framework covered with plywood. The " Spartan " fuselage is built in two sections, the forward one extending from the engine to just aft of the rear cockpit, and the rear section from the cockpit to the sternpost. The two halves are joined with external fishplates, and can readily be detached from each other. In case of damage to the fuselage, one-half (forward or rear portion as required) only need be replaced.

The biplane wings are, as already mentioned, of bi-convex symmetrical section, with spindled I-section spruce spars and wooden ribs, covered with fabric. All components are built on jigs to ensure interchangeability. Ailerons are hinged to all four wings, and the aileron controls are so arranged that when the wings are folded there is no slacking off of the control cables, which are situated externally under the lower wings, where are also placed the cranks, etc. The design of the rear spar fittings must have been a difficult problem in view of the necessity for hingeing the upper and lower wings at this point, but the fitting evolved is neither expensive nor clumsy. All wings are built with a detachable section in the leading edge, near the wing tip. The object of this is that when a purchaser desires his machine fitted with the Handley Page automatic slots, these can be attached to any standard wing without the need for any structural alteration whatever, merely by bolting the slot mechanism on as complete units. When slots are not desired a plain section of leading edge is bolted on instead.

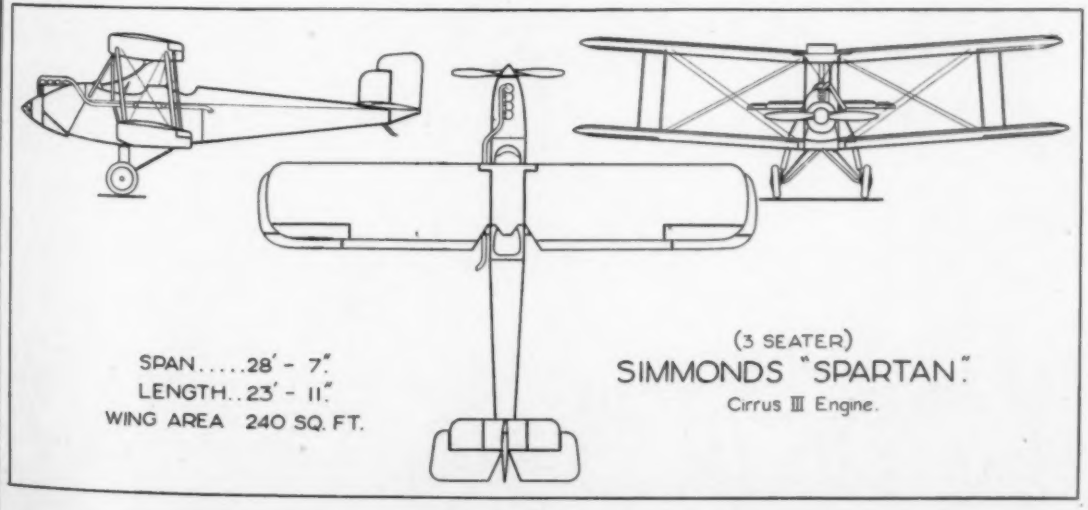
In the tail the system of interchangeability is also utilised to the fullest extent, the fixed tailplane consisting of a short-span centre-section secured to the fuselage, and of two end pieces attached to the centre-section by fishplates, each of these end pieces being identical and interchangeable with the vertical fin. The rudder is similarly identical with and can be interchanged with either of the two elevator flaps.

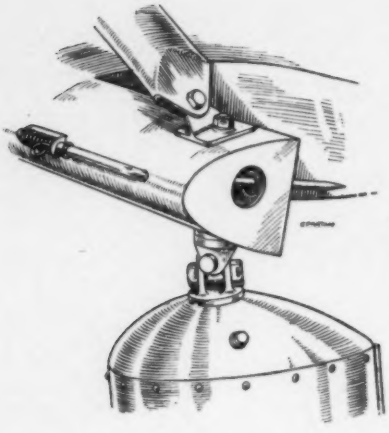
The undercarriage consists of two tripods, each carrying a wheel, and comprising a bent axle, a radius tube and the telescopic shock-absorbing leg. The fittings on the various members of the undercarriage are such that the same three components can be used on either port or starboard side of the machine, *i.e.*, there is no need for " left hand " and " right hand " parts.

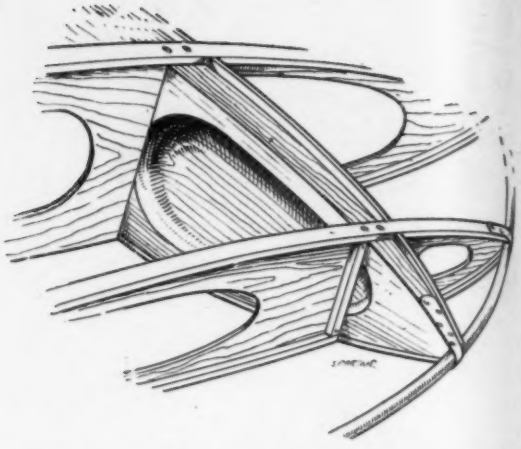
The two cockpits are roomy and the seats very comfortable. Large doors on the starboard side facilitate access to the cockpits without " gymnastics," and each cockpit is equipped with controls and a complete set of instruments. Behind the rear cockpit is a large luggage locker, the upper part of which extends aft inside the deck fairing so as to provide a space for golf clubs, guns, fishing rods, or similar lengthy articles.

The " Cirrus III " engine is mounted on a steel tube structure in the nose of the fuselage, separated from it by a fireproof bulkhead, and the petrol tank forms the centre section of the top plane. A large petrol gauge in the underside of the tank is visible from both cockpits and indicates the amount of fuel in the tank. The normal petrol capacity is 20 galls., but if desired this can be increased to 30 galls.

The main dimensions and areas of the Simmonds " Spartan " are as follows: length overall, 23 ft. 11 in.; wing span, 28 ft. 7 in.; overall height, 9 ft. 3 in.; folded width, 9 ft. 5 in.; total wing area, 240 sq. ft.







Undercarriage leg attachment and wing locking pin arrangement on the Simmonds "Spartan." On the right, details of spar and rib construction. ("FLIGHT" *Sketches.*)

The tare weight of the machine is 930 lbs. Although with normal load the "Spartan" will usually have a gross weight of about 1,300 lbs., the machine is built to strength factors which make it permissible to stunt it at a gross weight of 1,680 lbs. In other words, the certificate of airworthiness covers this weight for "aerobatics." For special long-distance flights the "Spartan" may be loaded up to 2,200 lbs. gross weight (when the C. of A. does not, of course, cover "aerobatics"). This will represent a petrol load sufficient for a range of approximately 3,000 miles.

At normal load the wing loading is 5·8 lbs./sq. ft., and the power loading 14·7 lb./h.p. When loaded up to the "aerobatics" C. of A. gross weight of 1,680 lbs., these figures become 7 lbs./sq. ft. and 17·7 lbs./h.p. respectively. At normal load the performance is as follows: maximum speed at sea level, 100 m.p.h.; cruising speed, 80 to 85 m.p.h.; stalling speed, 40 m.p.h.; average initial climb, 5,000 ft. in 10·5 minutes; run to take-off, 90 to 110 yards; landing run, 50 to 70 yards. Range on normal tankage, 320 miles; petrol consumption at cruising speed, 16 miles per gallon.

In addition to the standard "Spartan" two-seater training machine, a coupé two-seater landplane will also be shown. The main difference between this and the standard machine is the addition of a special top or "roof." This cabin top extends right from the top longerons and leaves plenty of room inside. It is provided with sliding windows in the sides, as well as with sliding windows in the two doors.

Finally, Simmonds Aircraft, Ltd., will exhibit a three-seater "Spartan," the power plant of which is a "Hermes" engine. This machine is not a mere conversion of the standard two-seater, but has been specially constructed with a slightly longer front-portion fuselage, but for the rest composed of standard "Spartan" components. The aft cockpit is the normal, but the front cockpit is considerably longer than in the two-seater machine, and an ingenious arrangement of the seats permits the two passengers either to look forward or sit facing each other. A cross bar hinged at one end and having a catch at the other separates the two passengers, and when swung aside permits of easy access to the forward seat. If the machine is used as a two-seater, the forward part of the cockpit can be covered with an easily removable top carrying a windscreen.

Except for the overall length, which is slightly greater than the corresponding dimensions in the two-seater, the three-seater "Spartan" has the same dimensions and areas. The tare weight is 940 lbs., and the gross weight within the "aerobatics" C. of A. is, as before, 1,680 lbs. The load can be made up as follows: tare weight, 940 lbs.; pilot, 160 lbs.; two passengers, 320 lbs.; luggage, 80 lbs.; petrol (20 galls.), 150 lbs.; oil (3 galls.), 30 lbs.; gross weight, 1,680 lbs. The wing loading is 7 lbs./sq. ft., and the power loading 14·6 lbs./h.p.

The following performance figures are quoted: top speed at ground level, 107 m.p.h.; cruising speed, 90 to 95 m.p.h.; stalling speed, 44 m.p.h.; climb to 5,000 ft. in 10 minutes; ceiling, 16,000 ft.; range at cruising speed, 300 miles.

As we are about to go to press it is learned that the Spartan Coupé will not be finished in time to be exhibited.

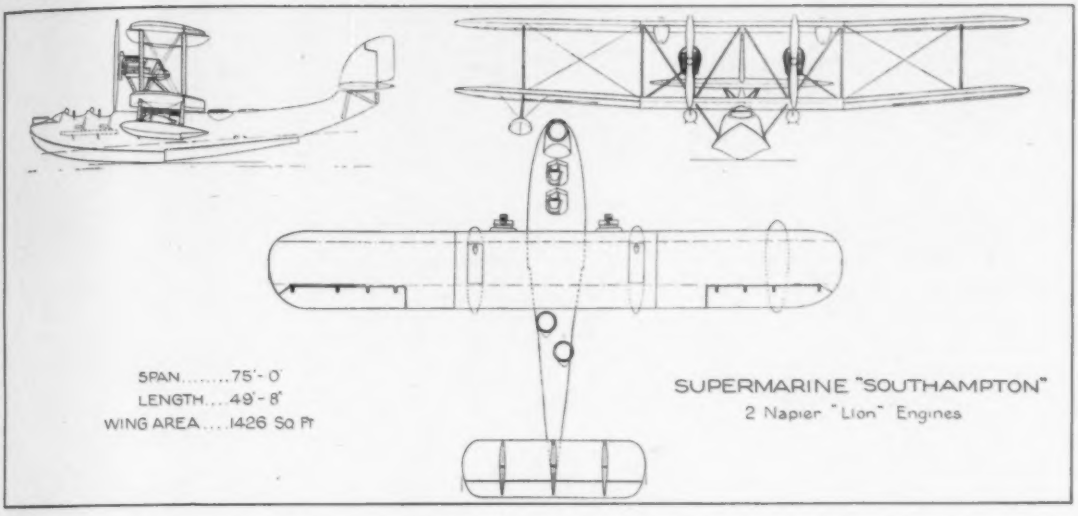
SUPERMARINE AVIATION WORKS, LTD.

As a result of the purchase, some months ago, of the Supermarine Aviation Works by Vickers (Aviation), Ltd., the two firms are now practically one, with Supermarine's looking after the maritime side and Vickers after the aeroplane side. This division is probably not intended to be an absolutely rigid and unalterable one, but with the accumulated experience of 15 or 16 years of specialising on marine aircraft, it may be assumed that in the great majority of cases the Southampton designing office will deal with marine types. It is logical that, on the other hand, Vickers (Aviation), Ltd., should devote their energies to aeroplanes of all types and classes, their experience of which dates back to the early days of flying in Great Britain. The two firms thus united are both among the pioneer aircraft companies of Great Britain, and the combination should be a very powerful one. At Olympia the two firms will naturally exhibit their aircraft together, but for the sake of easy reference we have thought it preferable to deal with the exhibits separately.

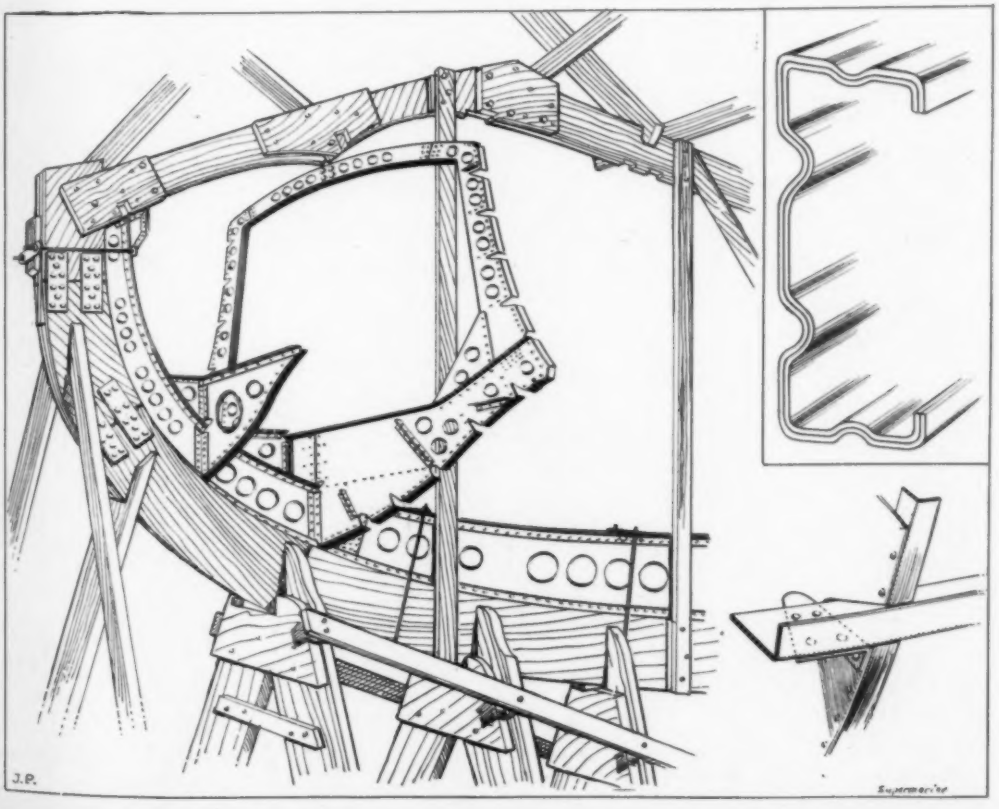
Supermarine's will, it is hoped, exhibit two complete marine aircraft: One of the metal "Southampton" flying-boats with Napier "Lion" engines which made the 27,000 miles' R.A.F. Far East Flight, and the other the Supermarine S.5 with Napier racing engine which won the Schneider Trophy for Great Britain in 1927, and which, in 1928, gained the British high-speed record of 319·57 m.p.h.

The Supermarine "Southampton" is a twin-engined five-seater reconnaissance flying-boat, and is the standard machine of this type used by the Royal Air Force. Similar machines have been supplied to the Royal Australian Air Force, the Imperial Japanese Navy, and the Argentine Navy. In 1927–28 four metal-hulled "Southamptons" of the Royal Air Force flew from Plymouth to Singapore, thence around the continent of Australia, and back to Singapore, a distance of some 27,000 miles. This formation flight was carried out without serious trouble of any description.

The hull of the metal "Southampton" is built almost entirely of duralumin, the only exception being certain highly-stressed fittings, which are made from stainless steel. As regards hydrodynamic design, the "Southampton" metal



hull differs slightly from the older type wooden hull in its lines. This applies mainly to the sides of the hull, which have a less pronounced curvature between deck and chines than had the wooden hulls. Although the effect (which is probably relatively small) is hydrodynamic and aerodynamic, the cause must be sought in structural considerations. The more flat-sided form is necessarily a good deal easier to produce in metal, and as far as we have been informed, the metal hull is certainly not less good either on the water or in the air than was the wooden hull. The step arrangements and disposition and the up-swept stern portion remain practically identical. One very great advantage of the metal hull is, of course, the total absence of water soakage, which in a hull of this size may easily amount to some 300 lbs. or even more. Apart from this, the weight of the duralumin hull is, in itself, smaller than the *dry* weight of the wooden hull,



THE SUPERMARINE "SOUTHAMPTON": Details of the metal hull construction. The hull is shown on the stocks. Inset, a duralumin wing spar. ("FLIGHT" *Sketches.*)

so that one way and another it will be realised that the use of metal hulls on the " Southamptons " has been very well worth while. One difficulty of duralumin hulls, that of corrosion, appears to have been successfully overcome in the " Southampton " type of hull. Anodic treatment is some protection, but a good paint is probably at least as good, and possibly better. On the Far East Flight surprisingly little corrosion took place, as visitors to Olympia will be able to see for themselves, the hull of the " Southampton " exhibited being one of the actual four machines which made the flight.

Structurally, the metal " Southampton " hull is of interest on account of the form of construction employed. The fore and aft members, or stringers, run through from bows to stern, the frames being cut to accommodate them. The duralumin skin or planking is riveted to both frames and stringers. With this form of construction the planking is not called upon to resist longitudinal bending loads to as great an extent as in hulls where the stringers stop short at the frames. On the other hand, presumably, the frames themselves must be slightly weakened by being cut, although this can fairly easily be made up by local strengthening.

As exhibited at Olympia, the " Southampton " will have an all-metal superstructure, whereas on the Far East Flight it was fitted with the older type composite construction wings. The metal wings have spars and ribs of duralumin, but are, of course, fabric covered. In arrangement, the wings are of equal span and chord, and without stagger. Top and bottom centre-sections are of equal span, interconnected by vertical struts at their ends, and with four sets of struts in the form of a letter " W " when viewed from the front, in between which are mounted the engines.

The tail unit consists of a monoplane tail plane and elevator, with three vertical fins mounted on top of the tail plane and carrying three balanced rudders.

The standard " Southamptons " are fitted with two Napier " Lion " engines, supported on steel strut mountings, which are complete units independent of the wing bracing members. A large variety of other engines can be fitted if desired. Bristol " Jupiters " and French Lorraine Dietrich engines have already been so fitted, while a design is now in progress in which Armstrong Siddeley " Jaguars " are employed. The Rolls-Royce " F " type engines can also be used.

Fuel is carried in two main tanks slung under the top centre-section, the capacity being 500 gallons. Subsidiary petrol tanks each of 50 gallons capacity can be fitted under the wing roots if the machine is required for long-distance work.

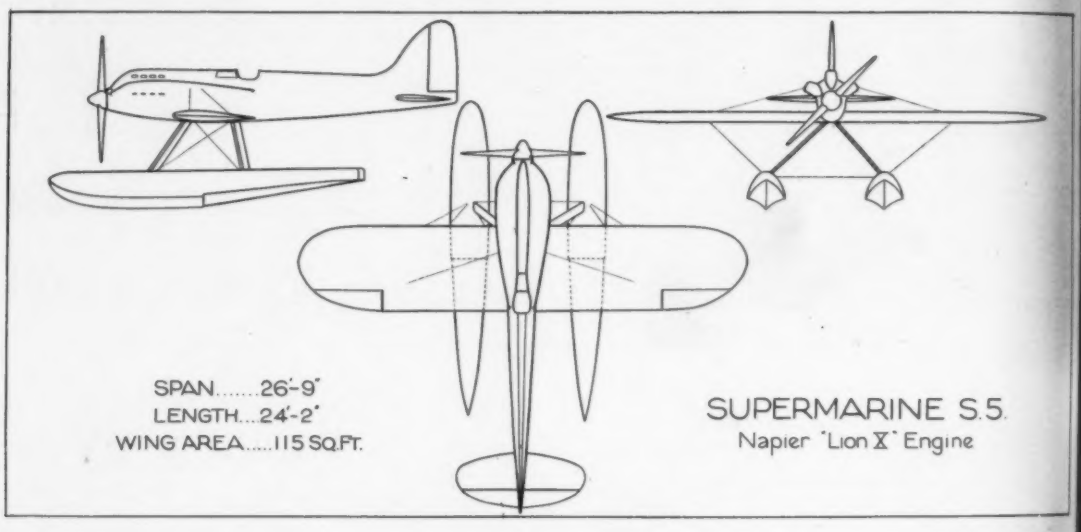
The accommodation in the " Southampton " is as follows : In the bows is the cockpit for gunner and bomber. This is provided with a Scarff ring for machine guns. Behind are two cockpits for the pilots, arranged in tandem, with dual controls. The after pilot also has a complete navigation equipment. Below the wings is the wireless compartment, which communicates with two staggered cockpits, aft of the wings, each equipped with Scarff gun ring.

Main dimensions of the " Southampton " are :—Length, o.a., 49 ft. 8 in. ; wing span, 75 ft. ; wing area, 1,426 sq. ft. ; overall height, 18 ft. 7 in.

The tare weight is 8,760 lbs., and the gross weight (normal load) 14,600 lbs., giving a wing loading of 10·25 lb./sq. ft. and a power loading (with Napier " Lion " engines) of 15·5 lb./h.p.

Brief performance figures are :—Full speed, 108 m.p.h. ; landing speed, 52 m.p.h. ; climb to 5,000 ft. in 10 mins. Ceiling, 14,000 ft. Range, 800 miles with normal quantity of fuel.

The Supermarine-Napier " S.5 " racing seaplane is, as already mentioned, the type which won the Schneider Contest in 1927. Two of these machines are being used by the high-speed flight of the Marine Aircraft Experimental Establishment of the R.A.F. as practice machines for this year's Schneider Trophy Contest, and as one " S.5," piloted by Flight-Lieut. D'Arcy Greig, has established a British speed record of 319·57 m.p.h., no visitor to Olympia should fail to inspect the " S.5 " on the Supermarine stand.



The " S.5 " is a low-wing braced monoplane, with twin-float undercarriage. The fuselage is a duralumin monocoque, while the wings are of wood construction, covered with plywood ⅛-in. thick. Over the wing covering are placed the wing surface radiators.

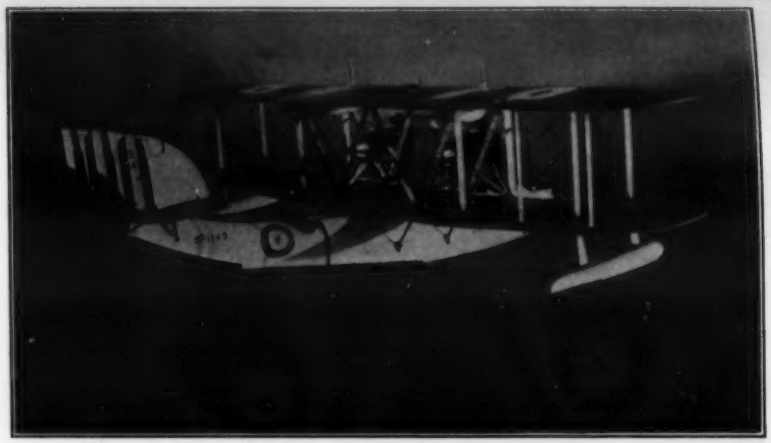
The duralumin floats are of the long, single-step type, and have a backbone in the form of one central longitudinal bulkhead of sheet duralumin, to which the transverse frames are attached.

A special racing type of Napier engine is fitted in the nose and is entirely covered in. The water header tank is housed in the central cylinder block fairing, while the main petrol tank is situated in the starboard float of the undercarriage. An auxiliary gravity tank is housed in the fairing of the starboard cylinder block. The total petrol capacity is 55 gallons.

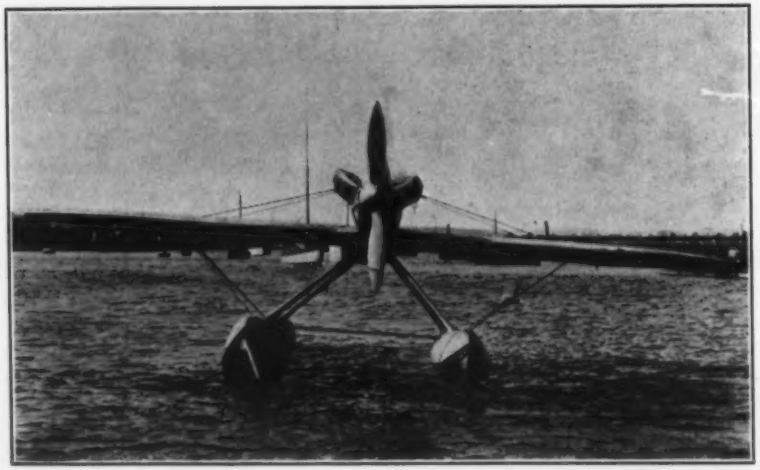
With a wing span of but 26 ft. 9 in. and a wing area of 115 sq. ft., the " S.5," with direct-drive Napier, weighs 3,100 lbs., and with the geared Napier, the weight is 3,250 lbs. The maximum speed of the machine with direct-drive engine is about 300 m.p.h., and with the geared engine about 320 m.p.h. The landing speed is approximately 90 m.p.h., so that it will be realised that the " S.5 " is a very efficient aircraft, with a speed range of more than 3·5 : 1.

It is worth recalling that in the Schneider Trophy Contest of 1927 at Venice, the winner, Flight-Lieut. Webster, on one of the " S.5 " monoplanes averaged a speed over the 217 miles course of 281·65 m.p.h., while Flight-Lieut. Worsley, on a similar machine, averaged 273 m.p.h. In the course of the contest also the winning machine established a new world's record over a distance of 100 kms., with a speed of 283·66 m.p.h.

SIMMONDS 3-SEATER "SPARTAN." (A.D.C. "Hermes.")



SUPERMARINE "SOUTHAMPTON" (2 Napier "Lion".)



SUPERMARINE "S.5" (Napier Racing Engine).

VICKERS "VICTORIA" (2 Napier "Lion").

AT OLYMPIA

VICKERS (AVIATION), LIMITED

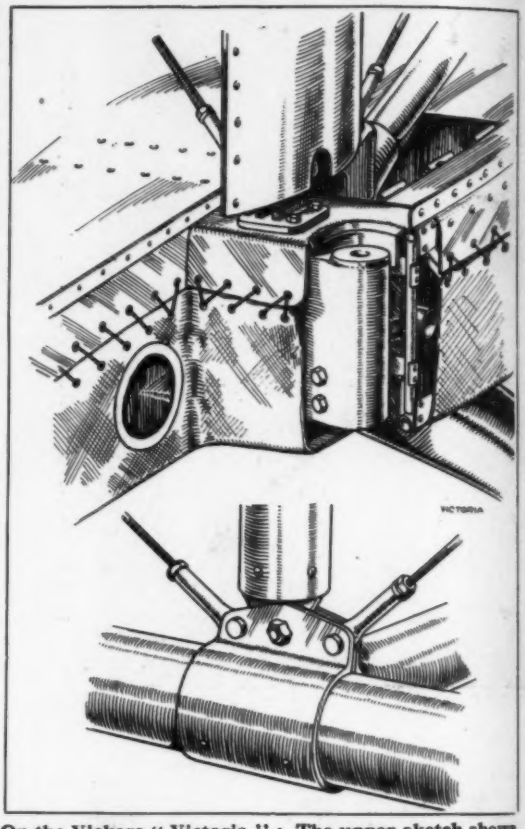
As previously mentioned, the Supermarine and Vickers exhibits will be staged on the same stand, and in addition to complete aircraft the Vickers Group will show a wide range of equipment, instruments, armament, etc. However, it is with complete aircraft that we are chiefly concerned here. Of these, Vickers (Aviation) Limited will exhibit two machines, the very large " Victoria " troop-carrier, and a small single-seater monoplane fighter.

The Vickers " Victoria " is not, it should be pointed out, a new type by any means, having been in use by the Royal Air Force for several years, and among its more recent accomplishments being the excellent service which the " Victoria " gave in evacuating over 600 European civilians from Kabul. The type is designed for and used largely by the R.A.F. in the Middle East, and is fitted with two Napier " Lion " engines. During the evacuation of Kabul " Victorias " made, during the period between December, 1928, and February, 1929, 83 flights between India and Afghanistan, covering in the course of this work no less than 33,000 miles.

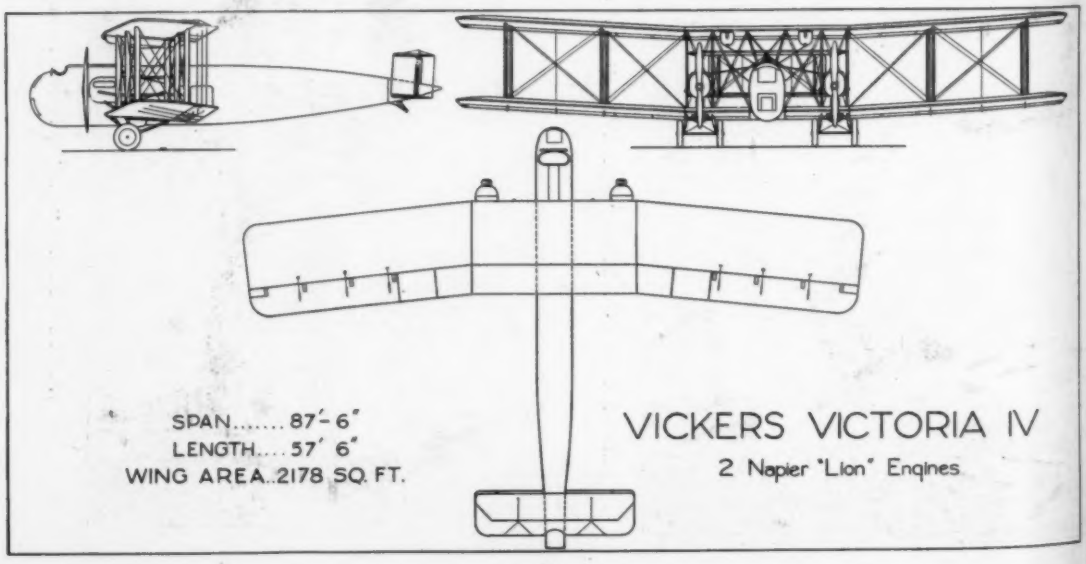
Technically and historically the " Victoria " is a development—through the 14-seater " Vimy " commercial and the " Vernon " troop carrier classes—of the famous " Vimy " in which the first direct flight across the Atlantic, the first flights from England to Australia and the first flights from England to South Africa were made in 1919 and 1920. The latest version of the " Victoria " is of all-metal construction, a fact which has resulted not only in a saving in structure weight but also in better ability to withstand the climate of the localities in the Middle East for which the machine was chiefly designed.

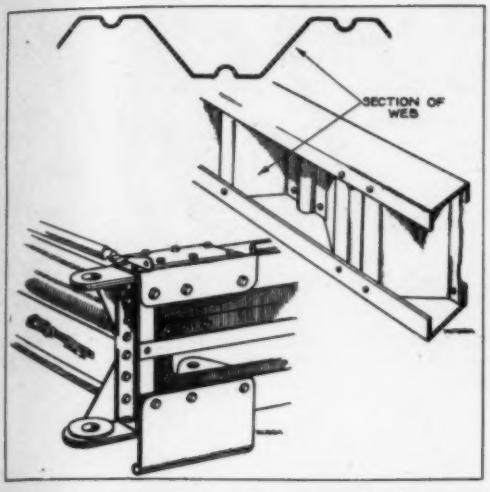
The fuselage of the " Victoria " is a composite structure, the front portion being a *monocoque* mainly of wood, and forming the cabin for the 22 troops which the machine is designed to carry. The rear fuselage portion, on the other hand, is a duralumin tube structure, in which plates wrapped around the longerons are used for joining struts and longerons. The covering of the rear portion is fabric.

The wing construction of the " Victoria " is similar, at least in general principle, if not in the matter of actual sizes and dimensions, to that used in a number of other Vickers types. The wing spars have flanges of channel section duralumin, and are joined together by a duralumin web running zig-zag fashion from front to rear flange. By the fact that the web crosses over diagonally, the need for diaphragms disappears, and the web performs the function of these as well as that of spar walls. The advantage of the zig-zag web is that riveting becomes very easy, there being no awkward and inaccessible corners anywhere in the wing spars. The main ribs are girders built of duralumin tubes joined by small duralumin plates which straddle the rib flange tubes. Here and there duralumin sheet is employed for wing covering in such a manner that the covering forms, with the ribs to which it is attached, a form of box rib of great strength, while the metal covering enables the crew of the machine to walk on the portions of the wing thus

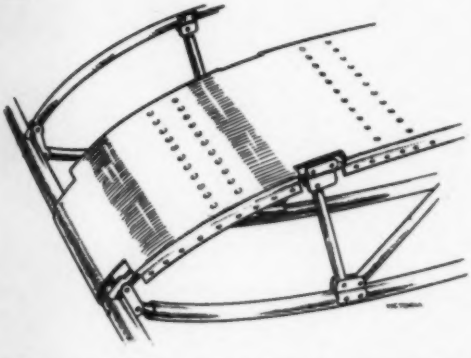


On the Vickers " Victoria " : The upper sketch shows spar hinge for folding the wings. Note how fabric is laced, and also interplane strut attachment. Below a typical fuselage joint in metal. (" FLIGHT " *Sketches.*)





In many Vickers machines use is made of a special form of spar construction, with channel section flanges and zig-zag webs. ("FLIGHT" *Sketches.*)



The ribs on the "Victoria" are of duralumin tube The metal covering in certain places reinforces the ribs and also serves as a platform for walking to engines, etc. ("FLIGHT" *Sketch.*)

covered, such as for example, out to the engines mounted on the wings.

As regards accommodation, the front cockpit is of the open type and situated in the nose of the *monocoque* fuselage. In it are seats and equipment for chief and assistant pilots. Behind their cockpit is the enclosed cabin, which on account of the form of construction adopted, "O" section formers covered with plywood, is particularly free of obstructions. The cabin has accommodation for 22 troops with their military equipment. Alternatively, a bomb load can be carried, sighting arrangements being provided through an aperture below the pilot's cockpit.

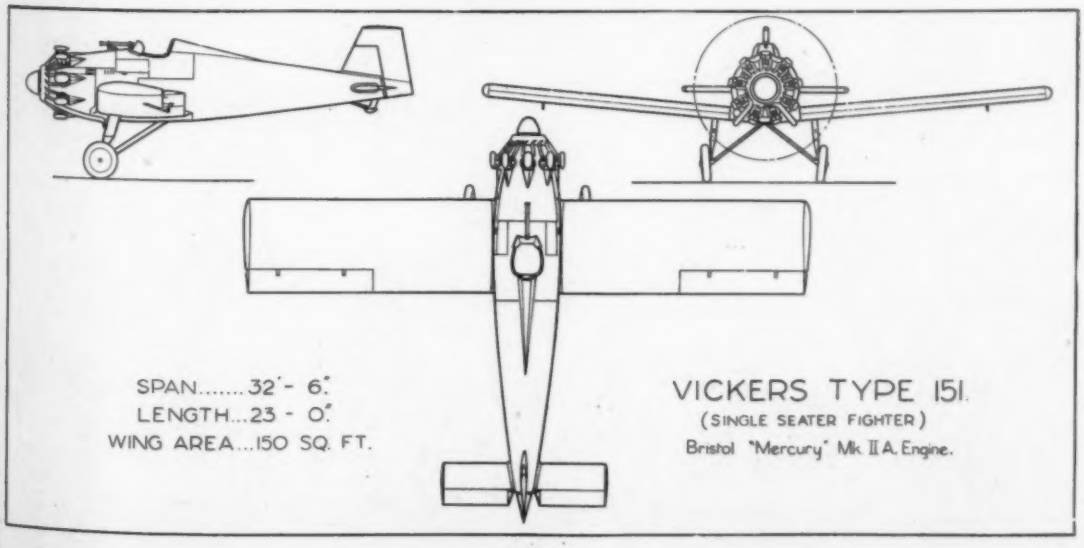
The Vickers "Victoria" has an overall length of 59 ft. 6 in., while the wing span of both planes is 87 ft. 4 in., and the wing chord of both planes 13 ft., giving a total wing area of 2,178 sq. ft. The petrol is carried partly in a large tank in the belly of the fuselage (215 gallons) and partly in two wing tanks, which have a capacity of 95 gallons each.

The tare weight of the "Victoria" is 10,030 lbs., and the weight fully loaded 17,460 lbs., giving a wing loading of 8 lbs./sq. ft. and a power loading (on maximum power of 1,140 b.h.p.) of 15·3 lbs./h.p. Performance figures are, unfortunately, not available.

The remaining Vickers machine to be exhibited on this stand will be an interception fighter. Carrying the Vickers works series number type 151, this is a low-wing monoplane of all-metal construction and fitted with a Bristol "Mercury II A" engine. As the title indicates, the type 151 is designed for intercepting enemy aircraft at a great altitude, and this necessitates not only a phenomenal rate of climb but also a very high-speed at 20,000 ft. or more. The Bristol "Mercury II A" engine is supercharged in order to maintain its power at altitudes. Performance figures of the Vickers 151 cannot be given, but it is permissible to point out that in its construction duralumin is largely used, even to the wing covering which is of this material. Incidentally, the Vickers interception fighter will be the only British aircraft at Olympia to have metal wing covering. The details of the construction have already been dealt with in FLIGHT to some considerable extent, although not as referring to this particular machine. It may be recalled that the duralumin sheet wing covering is applied to the duralumin internal wing structure by the patented Vickers-Wibault process.

The fuselage is also entirely of metal (duralumin) construction, and the machine is designed to carry two Vickers' guns as its armament. The undercarriage is provided with hydraulically-operated wheel brakes of the Vickers' patented type, which has previously been described in FLIGHT.

Vickers-Armstrong, Ltd., will exhibit, on the Vickers-Supermarine stand, a number of Vickers' automatic guns, gun sights, gunnery training apparatus, bombs, complete with fuse components, bomb carriers, bomb release controls, bomb sights, bomb training apparatus, rifle calibre ammunition and ammunition belt feed links, etc., etc. The English Steel Corporation, of the Vickers Group, will show an aero engine crankshaft stamping weighing nearly 17 cwt., a



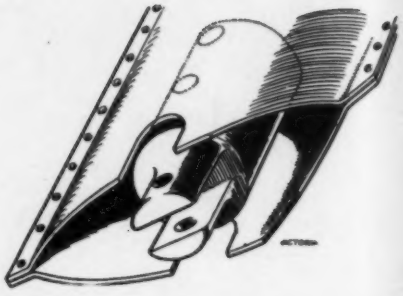
duralumin crankcase stamping, and a master connecting rod 2 ft. long by 6 in.

The Vickers' stand will also contain examples of the aircraft accessories produced at the Vickers Weybridge works, while to those technically inclined, the special exhibit dealing with the theory and practice of aeronautical engineering will be particularly interesting.

Finally there will be on view on the Supermarine-Vickers stand a number of examples of Supermarine aircraft construction. These will include specimen tests pieces of various materials, to illustrate their relative anti-corrosion properties. In the "Southampton" flying-boats all-steel fittings are of the stainless steel class, and a number of fittings, built-up and welded, will be exhibited.

In view of the problems associated with efficient cooling of high-power racing aero engines on high-speed seaplanes, a section of a wing of an "S.5" showing the details of the type of radiator used should be carefully studied.

Finally, a number of drawn duralumin sections used in aircraft construction serve to illustrate the many forms in which this material may now be obtained.



The interplane struts on the "Victoria" are formed from thick duralumin sheet, riveted along both edges. ("FLIGHT" *Sketch.*)

WESTLAND AIRCRAFT WORKS

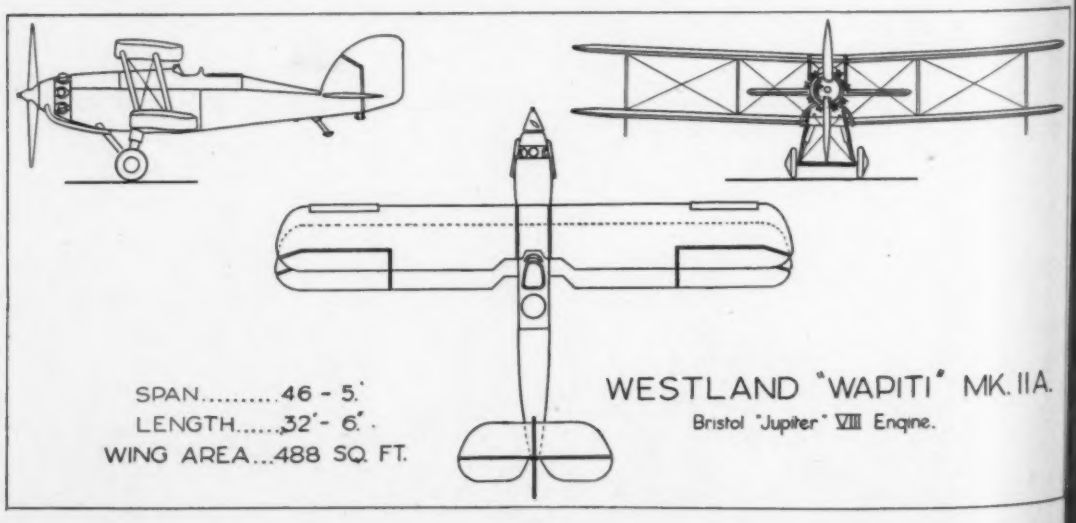
THE Westland Aircraft Works, which are a branch of Petters, Ltd., will be represented at Olympia by three complete aircraft and one "Wapiti" fuselage, shown in skeleton. The three machines will be: One "Wapiti" General Purpose two-seater, with Bristol Series VIII engine, one "Westland IV" three-engined limousine, with three "Hermes" engines, and one "Widgeon" Mark IIIA light monoplane with "Cirrus" Mark III engine.

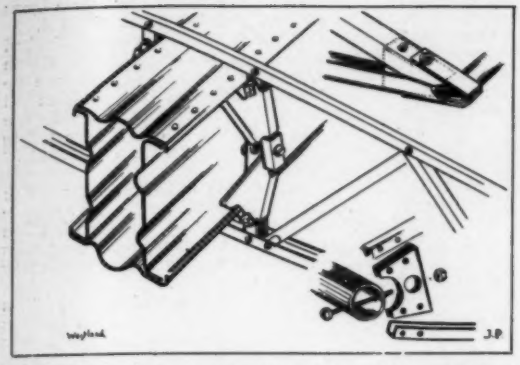
The Westland "Wapiti" has now been in use with the Royal Air Force for some years, and has proved itself an unusually effective type of aircraft. Designed as a general purpose machine, the "Wapiti" has to carry a great deal of equipment, which not only means that its useful load has to be great, but also that the internal accommodation of the fuselage must be roomy, in order to enable all the various gear to be stowed away, and yet be readily accessible. Add to these requirements the fact that the performance must be good, and it will be seen that in the design of the "Wapiti" a good many problems had to be overcome. That the Westland designers *have* solved the various problems is proved by the fact that, in addition to large numbers now in service with the Royal Air Force, the "Wapiti" has been ordered in considerable quantities by the Royal Australian Air Force and the South African Air Force, as well as others.

Originally, the "Wapiti" was designed as a mixed construction machine, but is now supplied as an all-metal aircraft, in which form it will be exhibited at Olympia. The fuselage construction makes use of square-section duralumin tubes, and in this connection, reference should be made to the skeleton fuselage which will be exhibited. This will be fitted with an Armstrong Siddeley "Jaguar" engine, and visitors to Olympia will have an opportunity to examine the typical Westland construction in detail on the skeleton fuselage. We gather that a "Jaguar"-engined "Wapiti" will be stationed at Heston aerodrome for demonstration purposes, so that potential purchasers may see and judge for themselves the capabilities of the machine.

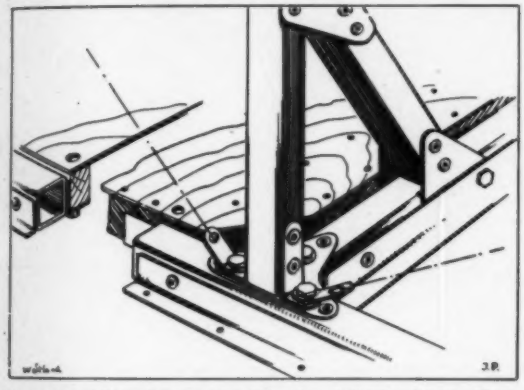
In the front portion of the "Wapiti" fuselage strut bracing is employed, the struts being, like the longerons, duralumin tubes of square section, and the joints between longerons and struts being made by means of flat flitch plates and tubular rivets. The strut ends do not bear upon the sides of the longerons, all bearing loads being taken by the tubular rivets. In the aft portion of the fuselage tierod bracing is used. The fuselage covering is fabric on the rear portion, but aluminium in front, the metal sheets being fluted at intervals of some 6 in. to give stiffness to the covering.

It is perhaps indicative of the versatility of the Westland "Wapiti" that no less than three types of wings can be supplied with it. Some users still prefer the older type of wings of mixed construction, with wooden spars and ribs, mainly on account of the greater facility with which repairs can be carried out in service where the necessary plant for metal work does not exist. Then there is what may be termed the standard wing, which is of all-steel construction. This type of wing has been built, and is being built in large quantities for the "Wapiti" by the Gloster Aircraft Co., who had the plant and facilities already available when the



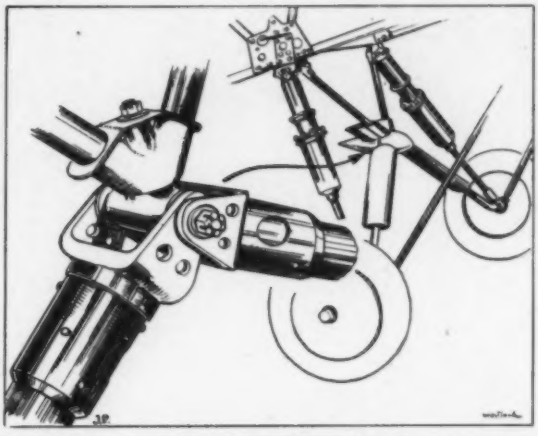


Duralumin wing construction on the Westland "Wapiti," showing spar, rib, leading and trailing edge. ("FLIGHT" *Sketches.*)



Support of flooring in the Westland "Wapiti." Note also square tube fuselage construction. ("FLIGHT" *Sketch.*)

orders for "Wapitis" became more numerous than could well be tackled by the Westland firm itself, at least at short notice. Extensions of the Yeovil works are now nearing completion, and when these are in working order doubtless all "Wapiti" wings will be made here. These will, in all probability, be of the third type of wing to which we have referred. This is a form of wing construction developed independently by the Westland technical staff, and uses duralumin as the chief constructional material. Finally,



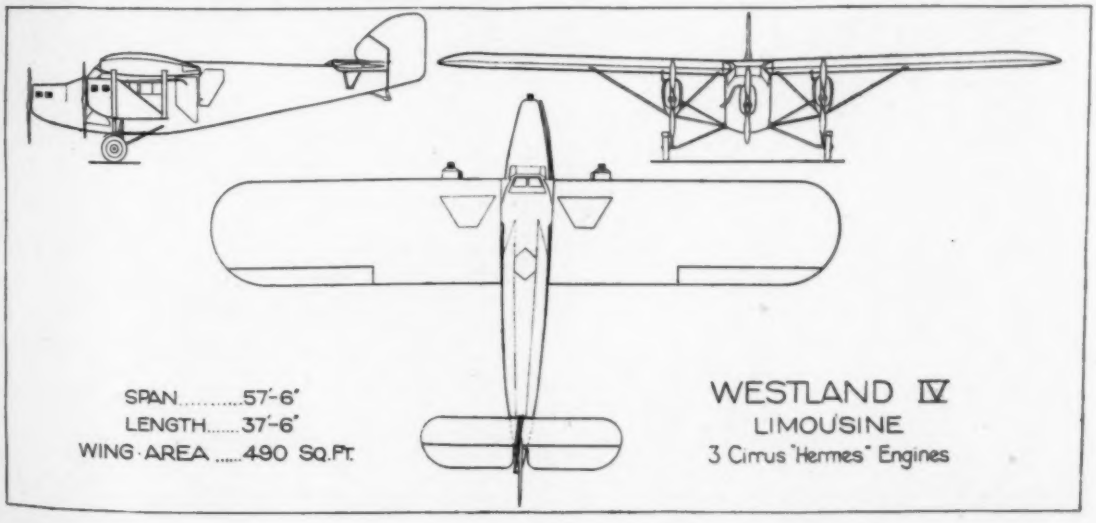
The latest type of undercarriage for the Westland "Wapiti" is of the split type, with oleo legs. ("FLIGHT" *Sketches.*)

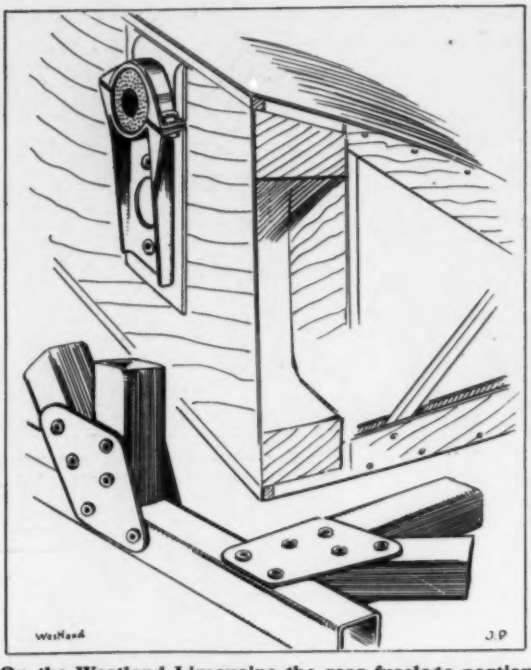
the "Wapiti" can be supplied fitted with Handley Page automatic wing-tip slots.

Apart from the choice of wings which the purchaser of "Wapitis" now has, there is also quite a wide choice of undercarriages. The standard undercarriage is of the normal Vee type with cross axle. An alternative type with divided undercarriage and oleo legs is also available if this type is preferred, it being often argued that the "split" undercarriage is less likely to trip a machine up if it has to operate from aerodromes with long grass, etc. Then there is available for anyone who wishes to use the "Wapiti" as a seaplane a twin-float undercarriage with duralumin floats. And finally a ski type of undercarriage has been fitted for use on snow and ice. It will thus be seen that the Westland "Wapiti" has amply justified its title of General Purpose aircraft. Incidentally, while the complete machine at Olympia will have the cross-axle undercarriage, the skeleton fuselage will be fitted with the split type.

As regards accommodation the "Wapiti" shows the usual seating arrangement, with pilot in the front cockpit, armed with machine gun with interrupter gear, and gunner-observer in the rear cockpit, which carries Scarff gun ring, etc. We cannot here go into details concerning the equipment normally carried by the "Wapiti," but it may be pointed out that the military load is high, no less than 1,108 lbs. This figure does not include fuel and oil, but does include the weight of the crew.

Normally the tankage is for 600 lbs. of petrol and 100 lbs. of oil, but for desert work this can be increased to 996 lbs. and 150 lbs. respectively. The tare weight is 3,048 lbs.,





On the Westland Limousine the rear fuselage portion is of square tube construction. Rubber buffers are used in the suspension of the petrol tank in the wing.
("FLIGHT" *Sketches.*)

and the normal load 1,808 lbs. inclusive of fuel and oil. For desert work the military load can be increased to 1,436 lbs. giving, with the fuel and oil weight indicated above, a gross weight of 5,630 lbs. The normal gross weight is 4,856 lbs.

The main dimensions of the Westland "Wapiti" are: Length o.a., 32 ft. 6 in.; wing span, 46 ft. 5 in.; height, 11 ft. 10 in.; wing chord, 5 ft. 9 in. Total wing area, 488 sq. ft. The wing loading at "normal" load is 9·95 lbs./sq. ft. and the power loading (at normal r.p.m.) 10·7 lbs./sq. ft. The maximum speed at 5,000 ft. is 142 m.p.h., and the cruising speed at the same height is 120 m.p.h. The climb is also particularly good. To 6,500 ft. in 6·4 mins.; to 10,000 ft. in 11 mins.; to 15,000 ft. in 15·2 mins. Service ceiling, 24,200 ft. Absolute ceiling, 25,700 ft.

With "normal" fuel the duration is ½ hr. at ground level and 3¾ hrs. at 15,000 ft. With "desert" fuel these figures become ½ hr. at ground level and 4¼ hrs. at 15,000 ft.

The second complete machine to be shown on the Westland stand will be a three-engined monoplane limousine. Known as the "Westland IV," this will differ slightly from the first machine of this type, which was first produced and tested a few months ago. The main changes will relate to the power plant, which in the show machine will be three "Hermes" engines instead of the three "Cirrus III" engines fitted in the first machine.

The "Westland IV" limousine is intended for use on "feeder lines" to the great trunk air routes, and as a machine for private charter and taxi work, where the freedom from forced landings given by the three-engined power plant arrangement is desired. It has seating accommodation for four passengers, a pilot and an engineer.

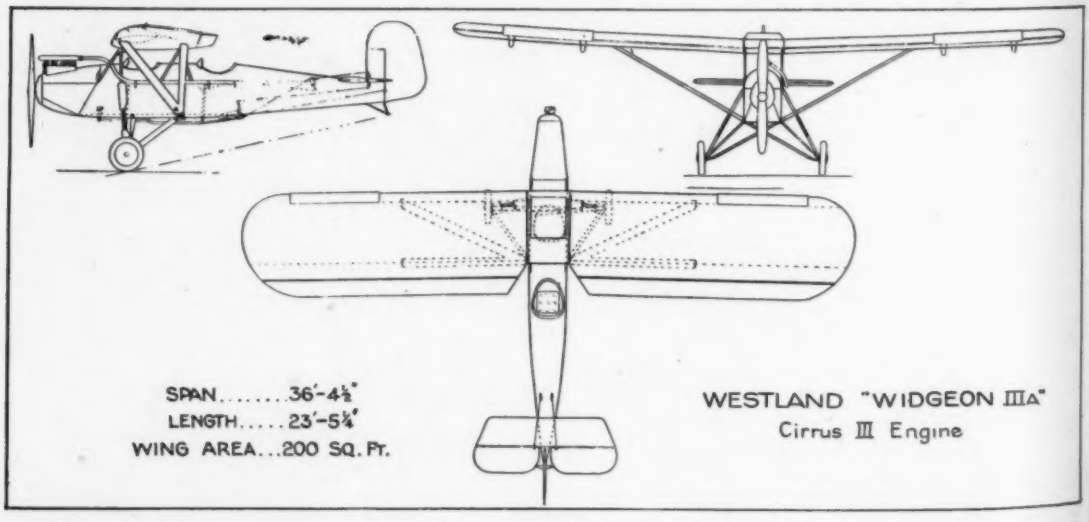
Arranged for *conduite interieure*, the "Westland IV" has pilot and engineer placed in a cockpit with large windscreens ahead of the monoplane wing, the passengers' saloon being under the wing and behind the cockpit. The saloon is entered through a door on the port side, and as the machine is very low over the ground, no steps are required.

The three engines are arranged in the usual way with one in the nose and two outboard under the wing, but the mounting of the wing engines is unusual in that these engines are not carried by the wing direct but on outriggers from the fuselage. The "Hermes" engines are almost totally cowled-in, and long exhaust pipes are fitted, terminating in "fish-tails," which have been found greatly to reduce the noise of the exhaust without, apparently, reducing the power of the engines.

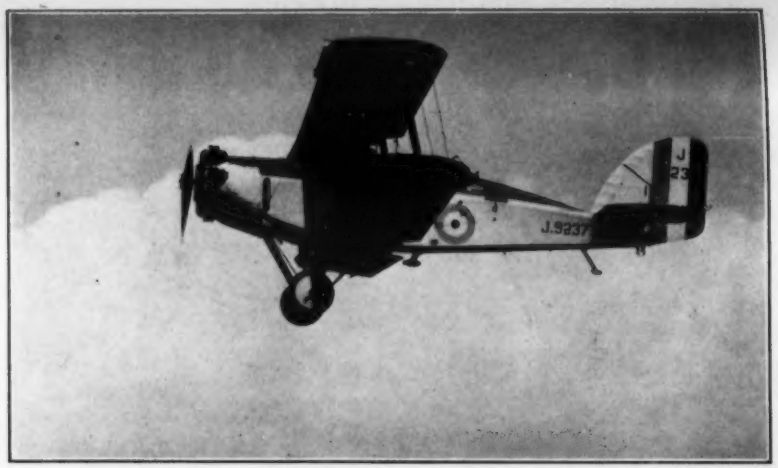
Constructionally the "Westland IV" is of composite type, the main planes and front portion of the fuselage being of wood construction, while the rear portion of the fuselage is of metal construction, as are also the elevators, ailerons and rudder. A wide-track undercarriage is fitted under the outboard engines and incorporates oleo legs. The normal petrol capacity is 96 gallons, giving a range of 525 miles.

The tare weight of the "Westland IV" is 3,150 lbs., and the weight of the aircraft with crew and the amount of fuel specified above is 4,260 lbs. As the gross weight is 5,500 lbs., this leaves a total *paying* load, for a range of 525 miles, of 1,240 lbs. The wing loading is 11·2 lbs./sq. ft. and the power loading (at normal r.p.m.) 17·45 lbs./h.p. The full speed at ground level is 120 m.p.h. and the cruising speed 100 m.p.h. The service ceiling is 12,000 ft. and the absolute ceiling 14,000 ft. With one of the three engines stopped the absolute ceiling is 6,000 ft. Rate of climb at ground level is 640 ft./min., and with one engine stopped 220 ft./min. It is interesting to note that with only one engine running the gradient of descent is 1 in 38 at 5,000 ft., so that even under these conditions the machine should in most cases be able to reach a field where a safe landing could be made.

The Westland "Widgeon" Mark IIIA is a light monoplane with "Cirrus III" engine, intended for the private owner, light 'plane club or flying school. At Olympia it is to be expected that the "Widgeon" will be very closely examined



VICKERS 151 S.S. FIGHTER (Bristol "Mercury IIa.").

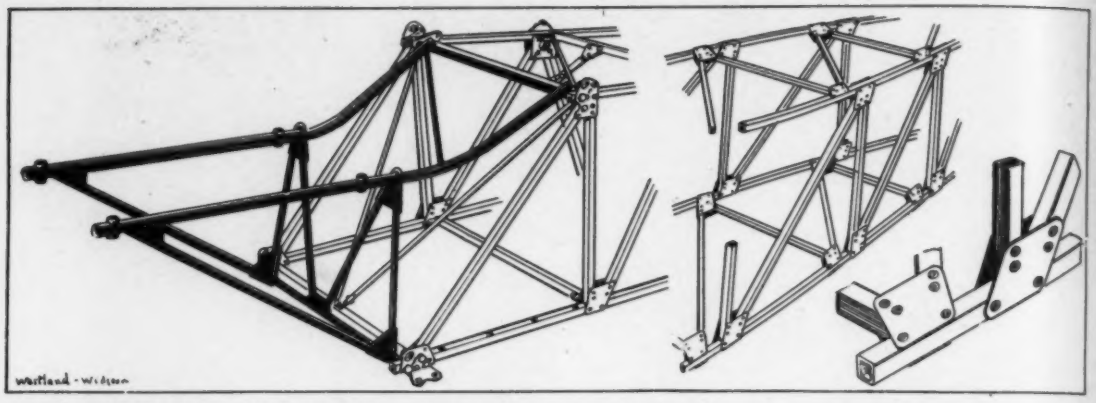


WESTLAND "WAPITI" (Bristol "Jupiter"). ("FLIGHT" *Photo.*)

WESTLAND LIMOUSINE (3 A.D.C. "Hermes"). ("FLIGHT" *Photo.*)

WESTLAND "WIDGEON" ("Cirrus III"). ("FLIGHT" *Photo.*)

AT OLYMPIA



THE WESTLAND ALL-METAL "WIDGEON": Details of the fuselage construction. ("FLIGHT" *Sketches.*)

in view of the recent announcement that the Westland Aircraft Works are willing to sell the building rights, drawings, designs, etc., having decided to discontinue the building of "Widgeon" machines in the future in order to concentrate on the "Westland IV" type referred to above.

The "Widgeon" is a parasol monoplane of mixed construction, with wings of wood and fuselage, ailerons and tail of metal. The Mark III A incorporates several improvements, such as the new type of split undercarriage, which has proved so effective in absorbing shock that stalled landings can be made without damaging the machine.

The parasol wing arrangement is claimed to give a large degree of automatic stability, and the "Widgeon" can be flown stalled without falling into a spin. If desired, it can be fitted with Handley Page automatic wing tip slots. The accommodation is the usual found in light 'planes, with the cockpits in tandem and dual controls. The wings are designed to fold, and the machine then takes up but little room.

The main dimensions of the "Widgeon" are: Length, o.a., 23 ft. 5 in.; wing span, 36 ft. 4½ in.; height, 8 ft.; wing chord, 6 ft.; width folded, 11 ft. 9 in.; total wing area, 200 sq. ft.

The tare weight of the "Widgeon" is 935 lbs. and the gross weight 1,650 lb. for "normal" certificate of airworthiness. For the "Aerobatics" C. of A. the maximum permissible gross weight is 1,450 lbs. The fuel capacity is of 20 gallons, giving a duration of 3¾ hours and a range of 315 miles. The full speed at ground level is 104 m.p.h. and the cruising speed 86 m.p.h. The service ceiling is 15,000 ft. and the rate of climb at ground level 640 ft./min.

A. V. ROE & CO., LTD.

OWING to the fact that the material dealing with the exhibits of A. V. Roe & Co. reached us very late, it has not been possible to include the article describing the Avro show machines in its proper place, alphabetically, and we have, perforce, had to place it here, at the end of our advance show report. While regretting the fact, we had no choice in the matter, as it was necessary to go to press with this week's issue of FLIGHT a good deal earlier than usual, and the make-up of the Olympia Show Report could not be deferred until the last minute.

At least four complete aircraft are expected to be shown on the Avro stand: An Avro 10, an Avro 5, an "Antelope," and a metal "Avian" with "Genet Major" engine. This engine is an entirely new type, produced by Armstrong Siddeley Motors, Ltd., and will make its public appearance for the first time at Olympia.

It is now several months ago that it was first announced that the British rights to construct the Fokker F.VII 3-m. had been acquired by A. V. Roe & Co., Ltd., and the machine to be known as the Avro 10 is, in fact, the first Manchester-built Fokker. It is a cantilever high-wing monoplane, powered by three Armstrong Siddeley "Lynx" engines, and has accommodation for eight passengers in the saloon and pilot and engineer or navigator in the cockpit.

The passengers' saloon is tastefully decorated and comfortably equipped, and the large windows, with the absence of a lower wing, give an excellent view outwards and downwards. A small step is permanently built on to the fuselage below the door, and no extra steps are required, owing to the low height of the fuselage above the ground.

Side-by-side seating accommodation is provided for pilot and engineer in the cockpit, and dual controls are fitted, with the usual foot bar for the rudder and wheel control for the ailerons. Three baggage compartments are available, with a total capacity of 114 cub. ft. Light luggage can be put in the racks under the roof of the saloon.

The three Armstrong Siddeley "Lynx" engines are mounted one in the nose of the fuselage and two outboard under the wing, from which they are supported on three bolts from the main wing spars.

Constructionally, the Avro 10 follows closely the original Fokker practice. The fuselage is a structure of welded steel tube construction, with bracing either in the form of diagonal struts welded to the longerons, or in the form of the well-known Fokker wire bracing looped through steel tube quadrants welded into the struts.

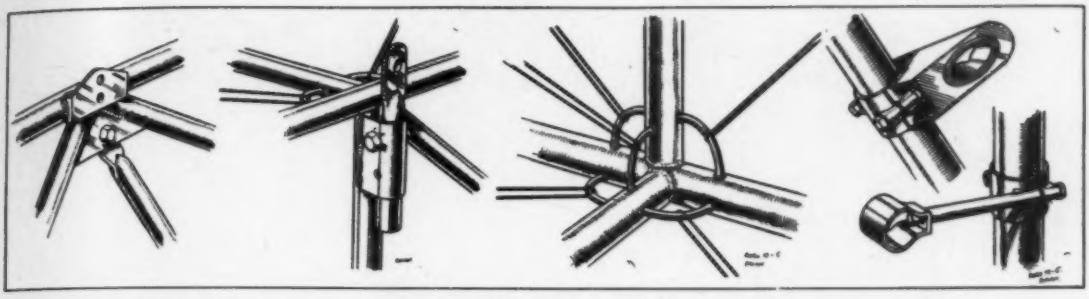
The monoplane wing is of all-wood construction, with three-ply planking, and there is no wire bracing, either inside or outside, the wing being a pure cantilever.

A wide-track undercarriage is fitted, consisting on each side of a radius rod, a bent axle, and the telescopic leg, which is taken to the outboard engine bearer. Wheel brakes are fitted.

The main dimensions of the Avro 10 are: Length, overall, 47 ft. 6 in.; height, overall, 12 ft. 9 in.; wing span, 71 ft. 3 in.; maximum wing chord, 12 ft. 6 in.; wing area, including ailerons, 772 sq. ft.; total area of ailerons, 44·6 sq. ft.; area of tail plane and elevator, 72·3 sq. ft.; area of fin and rudder, 25·5 sq. ft.

The tare weight of the Avro 10 is 6,276 lbs. This figure includes the saloon equipment, which weighs 256 lbs., so that if the machine is to be used for other than passenger carrying, the tare weight is correspondingly reduced. The non-paying load may be made up as follows:—Crew of 2, 360 lbs. fuel and oil for 4 hrs., 1,280 lbs.; wireless and lighting equipment, 205 lbs. Total, 1,845 lbs. The pay load in this case becomes 1,800 lbs., giving a total loaded weight of 9,921 lbs. For longer range, extra petrol can be carried without reducing the pay load, and the machine will, at a gross weight of 10,600 lbs., fly level without losing height with one engine shut off.

Performance figures for the Avro 10 are: Full speed



AVRO WELDED STEEL TUBE FUSELAGE CONSTRUCTION: On the left the front and rear spar attachment, with incidence adjustment, of "Avian". On the right, a typical fuselage joint as used in Avro 10 and 5 and "Avian", and method of attaching cowling clips and control rod guides.
("FLIGHT" *Sketches.*)

115 m.p.h.; cruising speed, 100 m.p.h.; range at cruising speed, 400 miles; rate of climb at sea level, 675 ft./min.; time to 1,000 ft., 1·6 mins.; time to 5,000 ft., 9·5 mins.; time to 10,000 ft., 25 mins. Service ceiling, 14,000 ft. Absolute ceiling, 16,000 ft. Take-off run, 275 yards. Landing run without wheel brakes, 330 yards. Landing run with wheel brakes, 230 yards.

In effect a smaller edition of the Avro 10, the Avro 5 is a small saloon monoplane with accommodation for pilot and four passengers, with room for an occasional fifth passenger when desired. The power plant consists of three Armstrong Siddeley "Genet Major" engines, a new type of engine which will be seen for the first time at Olympia. The construction of the Avro 5 is exactly similar to that of the Avro 10, with welded steel tube fuselage and all-wood monoplane cantilever wing, built in one piece.

The pilot is situated in a completely enclosed compartment forward of the leading edge of the wing. From this position he has an excellent view in all important directions. The saloon is very comfortably equipped, with a single seat providing ample room for two passengers fixed across the rear end of the saloon, while two armchairs, adjustable for position, are provided for the other two passengers. All passengers face forward. Adequate ventilation, heating and lighting of the saloon is provided. The dimensions of the saloon are: Length, 7 ft. 6 in.; width, 3 ft. 3 in.; height, 4 ft. 6 in. Two baggage compartments are provided, a smaller forward under the pilot's cockpit and a large aft of the saloon. The total capacity of the two compartments is approximately 46 cub. ft.

The overall dimensions of the Avro 5 are: Length, 35 ft. 9 in.; wing span, 47 ft.; height, 9 ft. 6 in.; maximum wing chord, 8 ft. 9 in.; wing area, 333 sq. ft.; wheel track, 11 ft. 3 in. (Dunlop wheels with brakes).

With a tare weight of 2,790 lbs. and a gross weight of 4,420 lbs., the non-paying load of the Avro 5 may be as follows: pilot, 180 lbs.; fuel, 455 lbs.; oil, 60 lbs.; lighting equipment, 75 lbs. Total 770 lbs. This leaves a pay load for 4 passengers and luggage of 860 lbs.

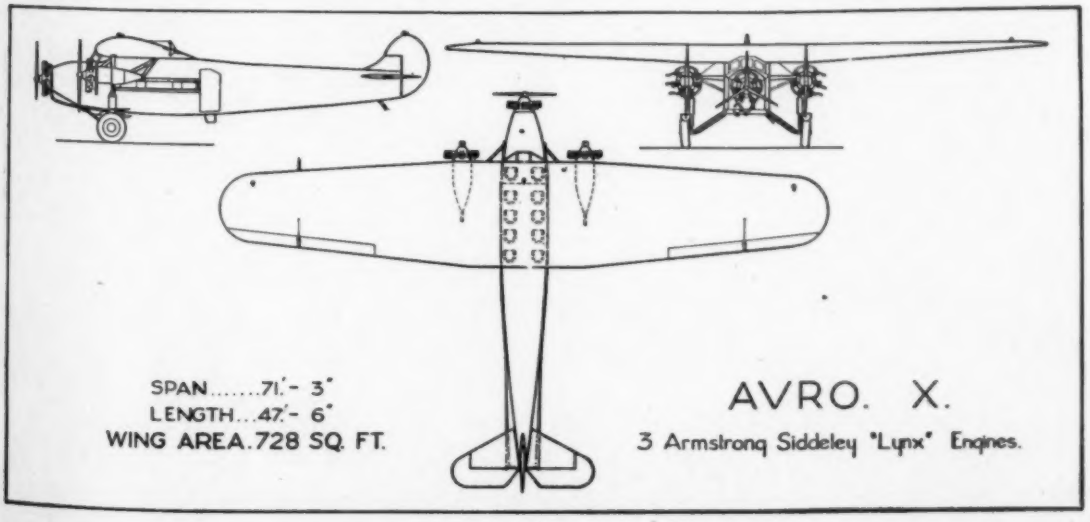
The performance of the Avro 5 is as follows: Full speed, 118 m.p.h.; cruising speed, 95-105 m.p.h.; range at cruising speed approximately 400 miles. Rate of climb at ground level, 750 ft./min.; time to 1,000 ft., 1·5 min.; time to 5,000 ft., 8·1 mins.; time to 10,000 ft., 22 mins. Service ceiling, 13,000 ft. Absolute ceiling, 15,000 ft.

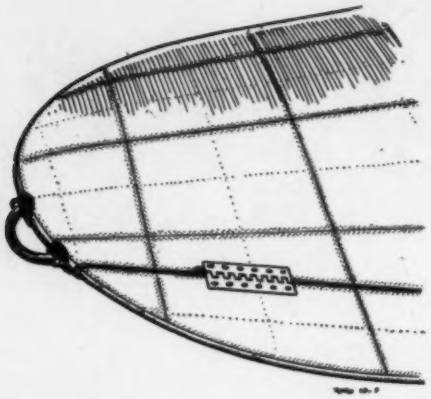
The Avro "Antelope" is primarily intended for duty as a high-performance day bomber, but by reason of its speed, manœuvrability and general design, it is particularly suited for service as a two-seater fighter, reconnaissance or general purpose aircraft.

The machine is a single bay biplane having a lower plane of smaller span and chord than the upper plane. "Frise" ailerons are fitted to the upper planes only, which are attached to a cabane, in the form of an inverted V, in front of the pilot's cockpit. At the point of attachment, the wing spars are tapered so that the section is such as to offer only the slightest obstruction to the pilot's view forward. This quality is further enhanced by the slope of the deck in a forward and downward direction and the rounding of the decking on each side. The height of the pilot's seat is easily altered, so that pilots of varying heights may take equal advantage of this arrangement of the upper main planes. It is also possible to alter the height of the pilot's seat during flight.

The main planes are slightly swept back and staggered, and owing to the small chord of the bottom plane, its leading edge is well behind that of the top plane, giving the pilot an excellent downward view.

The position of the bomber or gunner is aft of the pilot's cockpit and at a slightly lower level. The seat is adjustable. Particular care has been given to the arrangement and distribution of the armament and equipment.





The wing tips of the Avro 10 and 5 have hand grips for steadying machines on ground. The illustration also shows plywood planking and aileron hinge. (" FLIGHT " *Sketch.*)

The armament consists of one fixed Vickers gun firing forward through the airscrew and a Lewis gun in the rear cockpit.

The Lewis gun is mounted on a special Avro gun ring, having patented features and incorporating the wind balanced device. This type of mounting has a ring of smaller diameter than usual, and a very wide range is possible with the gun, which can be utilised to its fullest extent owing to the very narrow fuselage of this machine.

Bombs are carried on racks underneath the bottom planes, and a prone bombing position with a sliding window in the floor of the fuselage is provided.

The fuselage is of metal construction, and consists mainly of L angle duralumin channelling. It is covered with duralumin plates which are riveted on. This type of construction forms a rigid structure and no trueing-up is necessary.

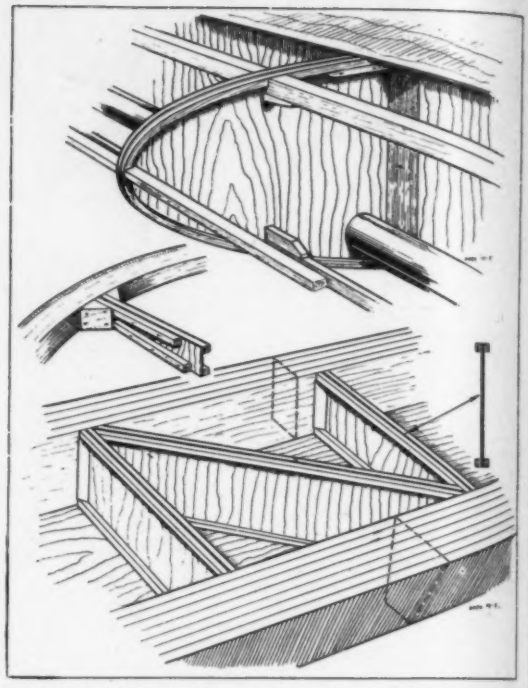
The main planes are of all-metal construction, with duralumin spars and ribs, but all fittings are of stainless steel. The covering is of doped linen.

Welded steel tube construction is employed for the tail unit. The incidence of the tail plane may be altered during flight by means of a handwheel in the pilot's cockpit.

The tail skid consists of a leaf spring with a wearing shoe of chilled cast iron. This type of skid has proved highly successful. Rebound is eliminated by the friction set up between the laminations.

The engine mounting is a welded steel tube structure, and is isolated from the fuselage by a fireproof bulkhead.

The undercarriage is of the Oleo and rubber compression type, with long oil travel, and is of particularly simple and clean design.



Details of the all-wood wing construction on the Avro 10 and 5. (" FLIGHT " *Sketches.*)

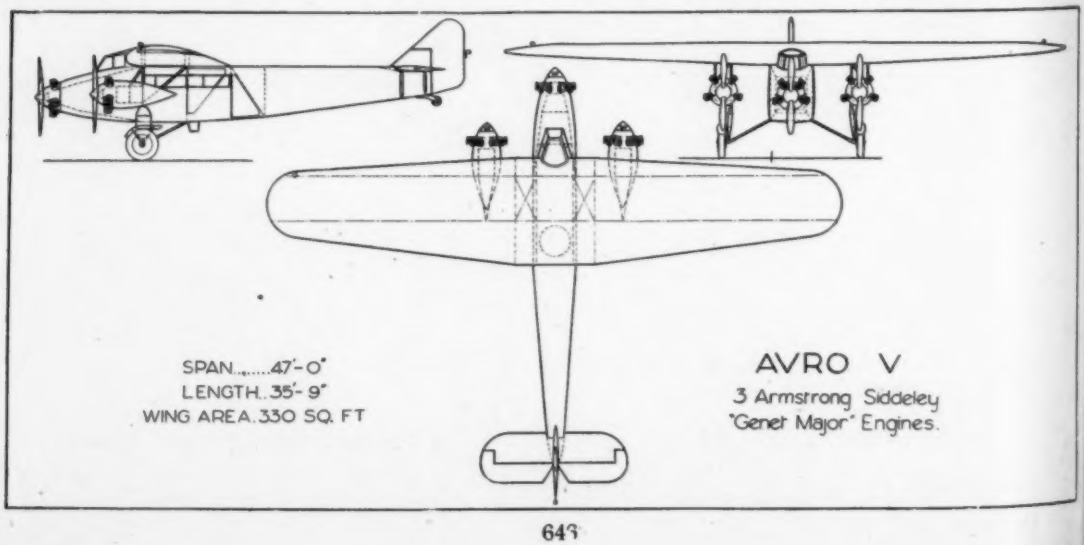
There are two fuel tanks, one main and one gravity, both situated in the fuselage immediately behind the fireproof bulkhead.

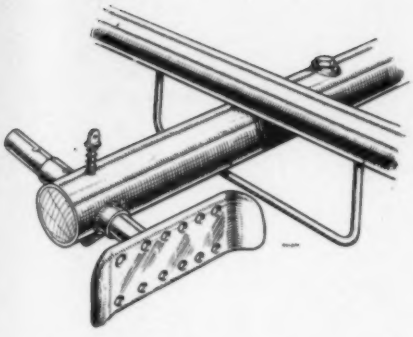
Cooling is by means of a honeycomb radiator carried in a tunnel, formed at the bottom of the fuselage. There is the usual shutter arrangement to vary the temperature.

The main dimensions of the " Antelope " are :—Length o.a., 31 ft. 2 in. ; wing span (top), 36 ft. ; wing span (bottom), 32 ft. ; height o.a., 10 ft. 9 in. ; chord of top wing, 7 ft. ; chord of bottom wing, 5 ft. ; gap, 5 ft. 4 in. ; total wing area, 377 sq. ft.

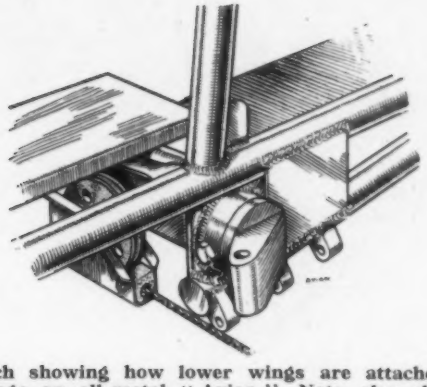
When fitted with the Rolls-Royce type F. XI B engine the " Antelope " has the following item weights : Structure, 1,350 lbs. ; power plant, etc., 1,337 lbs. ; total weight empty, 2,687 lbs. ; useful load, 1,852 lbs. Total weight fully loaded, 4,539 lbs. This figure gives a wing loading of 12 lbs./sq. ft., and a power loading of 8·4 lb./h.p.

The performance of the Avro " Antelope " with the Rolls-





Adjustable rudder pedals are provided on the Avro all-metal "Avian." ("FLIGHT" *Sketch.*)



Sketch showing how lower wings are attached to fuselage on all-metal "Avian." Note also chassis strut attachment. ("FLIGHT" *Sketch.*)

Royce F XI B engine throttle-gated to 3,000 ft. is as follows: Maximum speed at 5,000 ft., 170 m.p.h.; at 10,000 ft., 165 m.p.h.; at 15,000 ft., 155 m.p.h.; at 20,000 ft., 132 m.p.h. The landing speed is 63 m.p.h., and the cruising speed 145 m.p.h. The endurance at cruising speed is 4 hrs. Ground level rate of climb, 1,450 ft./min.; rate of climb at 3,000 ft., 1,500 ft./min. Time to 1,000 ft., 0·75 mins.; time to 5,000 ft., 3·8 mins.; time to 10,000 ft., 8·35 mins.; time to 15,000 ft., 16 mins.; time to 20,000 ft., 35 mins. Service ceiling, 20,000 ft. Absolute ceiling, 21,500 ft.

The Avro "Avian" light 'plane two-seater is a machine with a number of famous flights to its credit, among them being Bert Hinkler's flight from Croydon to Australia in 15¼ days last year. This performance has not since been beaten, or even equalled, by an aircraft of any power.

The "Avian" is now supplied with three distinct power plants: The "Cirrus III," the Armstrong Siddeley "Genet," and, quite recently, the Armstrong Siddeley "Genet Major" engine of 100 h.p. The performance of the machine naturally varies according to the power plant fitted, but in other respects the machine itself remains almost unchanged, so that the following notes may be taken to refer to all types.

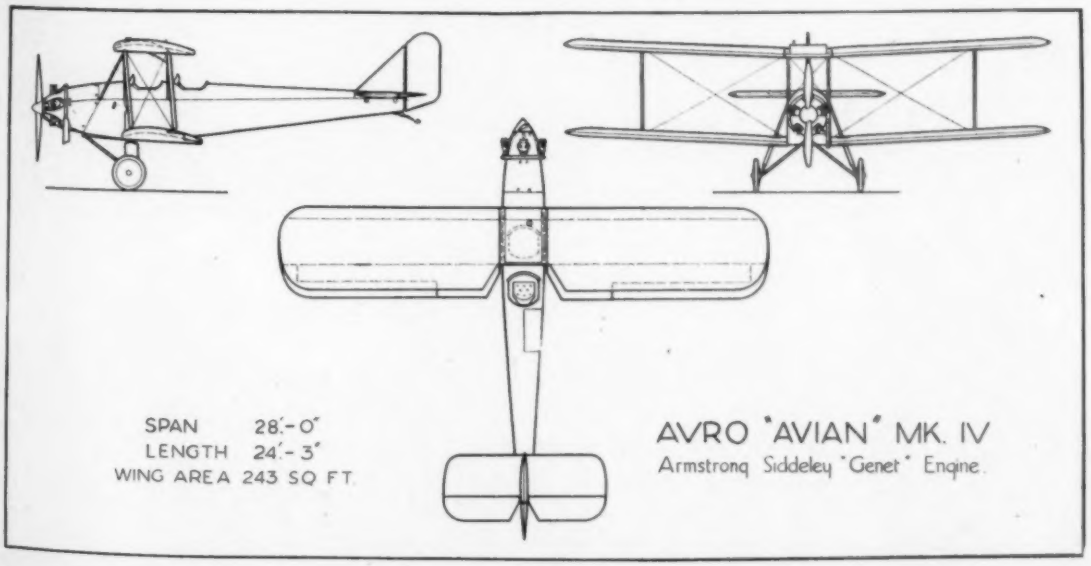
The "Avian," in all its variations, is a tractor biplane with accommodation for pilot and passenger. It may be used for school work or by the private owner, and may be purchased either as a landplane or as a seaplane. In its latest form the "Avian" is partly of metal construction in that its fuselage is of welded steel tube construction, of the same general type as that used in the Avro 10 and Avro 5 machines. The longerons and struts are of circular section and are joined by welding. In the side panels the bracing is by diagonal struts, while in top and bottom panels wire bracing is employed. The stringers of the deck and side fairings are of wood.

The "Avian" wings are mainly of wood construction, with wooden spars and ribs, although the top centre-section is a welded steel tube structure containing the streamline petrol tank, which has a capacity of 24 gallons. The wings are made to fold.

A new type of undercarriage has been produced recently for the "Avian." Previously a type of undercarriage was fitted in which, when the wings were folded, the wheels moved back slightly, thus reducing the load on the tail when the wings were folded. The new undercarriage has radius rods and bent axles hinged to the centre line of the bottom of the fuselage, while the telescopic leg is taken to the top longeron of the fuselage. The shock absorbers in the telescopic legs consist of rubber pads, integrally moulded with metal friction plates and separated by metal washers. The stroke of the leg is long, so that quite large shocks can be effectively absorbed. The wheel track is very wide (6 ft.) for the span of the machine, and the "Avian" can be taxied in a strong cross wind without risk of overturning.

As regards accommodation and equipment, the "Avians" of all types have the usual tandem seating arrangement, with adequate windscreens, dual controls, safety belts and all the usual instruments such as revolution counters, altimeters, airspeed indicators and oil-pressure gauges.

We regret that, owing to the fact that the "Avian" with "Genet Major" engine has but recently been completed, we have no figures of weights and performance of this machine. The standard "Cirrus Avian" landplane has the following dimensions: Length o.a., 24 ft.; wing span, 28 ft.; width, folded, 9 ft. 6 in.; overall height 8 ft. 6 in.

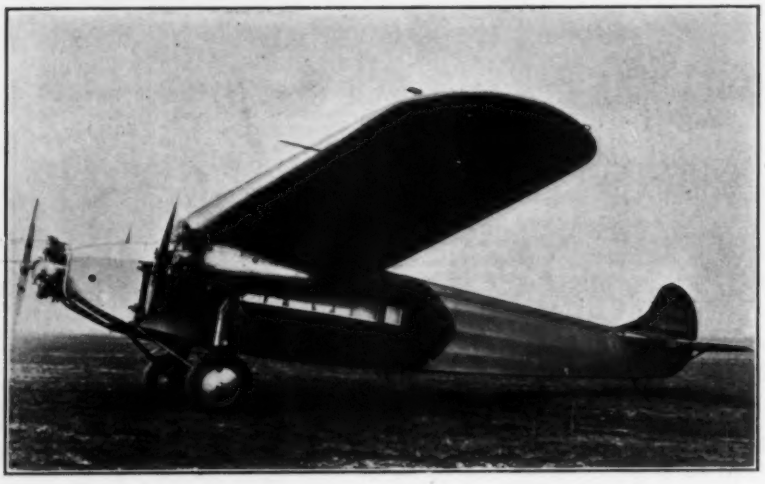


The tare weight of the "Cirrus Avian" landplane is 935 lbs. The load is made up as follows: Pilot, 165 lbs.; passenger, 165 lbs.; 20 gallons of petrol, 155 lbs.; 1½ gallons of oil, 15 lbs. Loaded weight, 1,435 lbs. Total permissible weight (Aerobatics C. of A), 1,450 lbs. Total permissible weight (normal C. of A.), 1,600 lbs.

At a gross weight of 1,435 lbs. the performance of the "Cirrus Avian" is as follows: Full speed at ground level, 102 m.p.h.; maximum speed at 5,000 ft., 98 m.p.h.; cruising speed at 1,000 ft., 87 m.p.h.; stalling speed, 40 m.p.h. Length of run to take off, 70 yards. Length of run after landing, 90-100 yards. Rate of climb at ground level, 750 ft./min. Time to 5,000 ft., 8 min.; to 10,000 ft., 21 min. Absolute ceiling, 18,000 ft. Range, 400 miles.

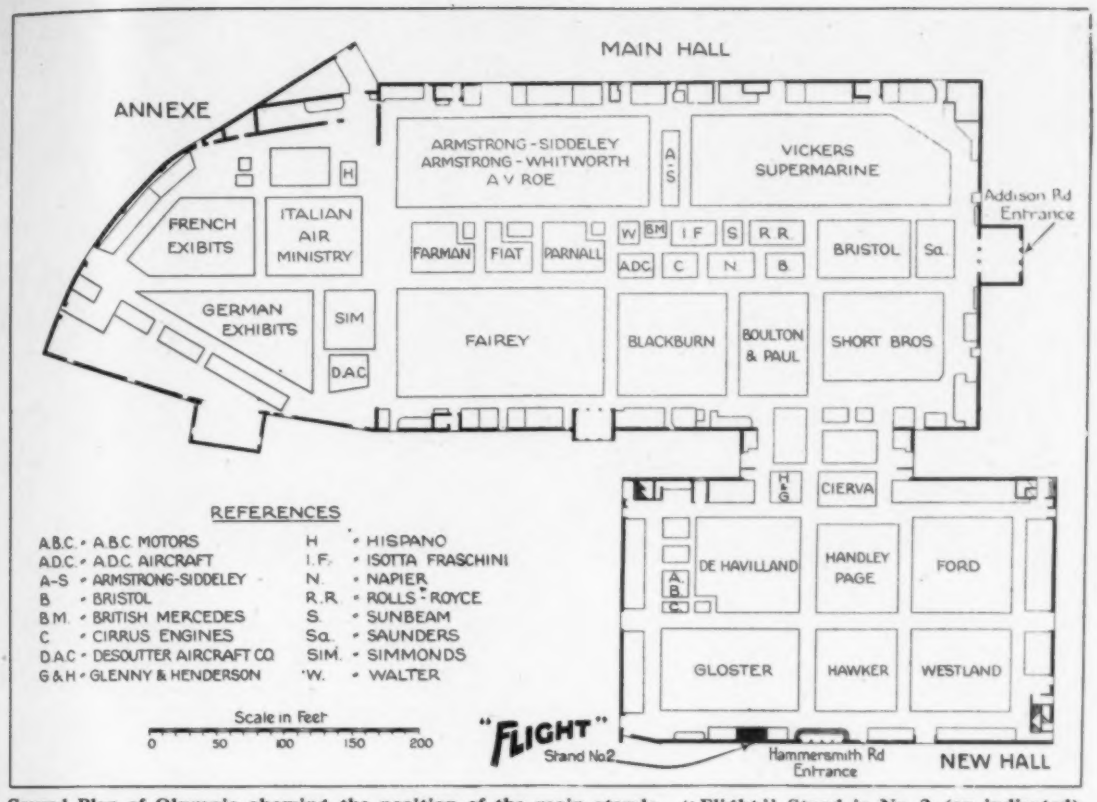
The "Cirrus Avian" seaplane has the same dimensions as the landplane, but the length is 25 ft. The tare weight is 1,053 lbs. and the loaded weight 1,553 lbs. The total gross weight for "normal" C. of A. is 1,600 lbs.

Maximum speed at sea level, 97 m.p.h.; at 5,000 ft., 93 m.p.h.; cruising speed at 1,000 ft., 82 m.p.h.; stalling speed, 42 m.p.h. Time to take off in still air, 8-10 secs. Rate of climb at sea level, 480 ft./min.; time to 5,000 ft., 14 mins., to 10,000 ft., 39 minutes. Absolute ceiling, 13,000 ft. Range, 400 miles.



AVRO 10
(3 Armstrong Siddeley "Lynx").

AVRO "ANTELOPE"
(Rolls-Royce F.XI B).



Ground Plan of Olympia showing the position of the main stands. "Flight" Stand is No. 2 (as indicated), immediately to the left upon entering the New Hall from the Hammersmith Road Entrance

LIST OF EXHIBITORS

The Stand number, in brackets, is at the end of each name

AIRCRAFT SECTION

A.B.C. Motors, Ltd. (13).
Air Ministry of Italy (62).
Armstrong Siddeley Motors, Ltd. (87).
Armstrong, Whitworth, Sir W. G., Aircraft Co., Ltd. (87)
Auto Auctions, Ltd. (42).
Blackburn Aeroplane & Motor Co., Ltd. (109).
Boulton & Paul, Ltd. (108).
Bristol Aeroplane Co., Ltd. (104).
Chambre Syndicale des Industries Aeronautiques (61).
Cierva Autogiro Co., Ltd. (20).
De Havilland Aircraft Co., Ltd. (16).
Desoutter Aircraft Co., Ltd. (53).
Fairey Aviation Co., Ltd. (110).
Farman, Soc. des Avions, H. & M. (88).
Fiat (England), Ltd. (90).
Ford Motor Co., Ltd. (33).
Glenny & Henderson (19).
Gloster Aircraft Co., Ltd. (4).
Handley Page, Ltd. (21).
Hawker, H. G., Engineering Co., Ltd. (22).
Lea, S. T. (64).
Parnall, George, & Co. (92).
Reichsverband der Deutschen Luftfahrt-Industrie (55).
Róe, A. V., & Co., Ltd. (87).
Saunders, S. E., Ltd. (105).
Short Bros., Ltd. (107).
Simmonds Aircraft, Ltd. (54).
Supermarine Aviation Works, Ltd. (85).
Vickers (Aviation) Ltd. (85).
Westland Aircraft Works (Petters, Ltd.), (28).

ENGINE SECTION

A.B.C. Motors, Ltd. (14).
A.D.C. Aircraft Ltd. (96).
Armstrong Siddeley Motors, Ltd. (86).
Bristol Aeroplane Co., Ltd. (103).
British Mercedes-Benz, Ltd. (95).
Chambre Syndicale des Industries Aeronautiques (61).
Cirrus Aero-Engines, Ltd. (99).
De Havilland Aircraft Co., Ltd. (15).
Farman, Soc. des Avions, H. & M. (89).
Fiat (England) Ltd. (91).
Hispano-Suiza, Automobiles (Gt. Britain) Ltd. (97).
Isotta Fraschini, Fabbrica Automobili (98).
Napier, D., & Son, Ltd. (100).
Parnall, George, & Co. (93)
Redrup Lever Engine Syndicate (12).
Reichsverband der Deutschen Luftfahrt-Industrie (55)
Rolls-Royce, Ltd. (102).
Sunbeam Motor Car Co. Ltd. (101).
Walter, J., & Co. (94).

ACCESSORY AND COMPONENT SECTION

A.C.-Sphinx Sparking Plug Co., Ltd. (31).
Accles & Pollock, Ltd. (166).
Aerofilms, Ltd. (187).
Aeronautical & Panel Plywood Co., Ltd. (1).
Aeronautics, Ltd. (36).
Air League of the British Empire (193 and 194).
Air Ministry (205 to 221).
Air Ministry of Austria (172).
Air Ministry of France (123).
Air Ministry of Italy (62).
Air Survey Co., Ltd. (158).
Aircraft & General Fine Art Co. (27).
"Aircraft Engineering" (161).
Aircraft Operating Co., Ltd. (187).
Aircraft Materials, Ltd. (132).
Aircraft Syndicate (121).
Airscrew Co. (129).
Airwork, Ltd. (119).
Aktiebolaget Flygindustri, c/o Trost Bros. (171).
Allen-Liversidge, Ltd. (37).
Aluminium (II), Ltd. (174).
Amalgamated Carburetters, Ltd. (134).
Anglo-American Oil Co., Ltd. (30).
Anti-Attrition Metal Co., Ltd. (138).
Auster, Ltd. (74).
Austin Reed, Ltd. (153).
Austrian Air Traffic Co. (172).
Automobile Association (156).
Automotive Products Co. (147).
Bakelite, Ltd. (191).
Barrus, E. P., Ltd. (160).
Bendix Perrot Brakes, Ltd. (131).
Birmingham Aluminium Casting (1903) Co., Ltd. (155).
Birmingham Medal Co., Ltd. (184).
Bonnella, D. H., & Son, Ltd. (190).
Booth, James, & Co. (1915), Ltd. (165).
Bowser, S. F., & Co. Ltd., Inc. (7).
Boyriven, Ltd. (52).
Bray, Gibb & Co., Ltd. (26).
Brevetti Aeronautici Salvator, Soc. Anon. (178).
British Aluminium Co., Ltd. (165).
British Cadastral & Topographical Air Survey Co., Ltd. (178).
British Celanese, Ltd. (152).
British Engineering Standards Association (203).
British Petroleum Co., Ltd. (170).
British Piston Ring Co., Ltd. (137).
British Thomson Houston Co., Ltd. (173).
Brooklands School of Flying, Ltd. (180).
Brooke Tool Manufacturing Co., Ltd. (201).
Brown Brothers, Ltd. (70).
Bruntons (47).
Caxton Name Plate Manufacturing Co. (79).
Cellon, Ltd. (23).
Chambre Syndicale des Industries Aeronautiques (60 and 62).
Champion Sparking Plug Co., Ltd. (176).
Chance Brothers & Co., Ltd. (139).
Chloride Electrical Storage Co., Ltd. (196).
Coan, Robert W., Ltd. (150).
Cobham, Alan, Aviation, Ltd. (140).
Connolly Brothers (Curriers), Ltd. (167).
Compagnie Aerienne Franco-Canadienne (168).
Coopers Mechanical Joints, Ltd. (145).
Desoutter Brothers, Ltd. (120).
Duckham, Alex., & Co., Ltd. (181).
Dunlop Rubber Co., Ltd. (32).
Educational Supply Association, Ltd. (148).
English Steel Corporation, Ltd. (85).
Essex Fire Extinguisher Co., Ltd. (177).

Fox, Samuel, & Co., Ltd. (75A).
Firth, Thos., & Sons, Ltd. (78).
"Flight," St. Martin's Publishing Co., Ltd. (2).
Gale & Polden, Ltd. (25).
Glacier Metal Co. Ltd. (50).
Graham, Alfred, & Co., Ltd. (130).
Grant & West, Ltd. (192).
Habershon, J. J., & Sons, Ltd. (38).
Harvey Frost & Co., Ltd. (141).
Hobson, H. M., Ltd. (17).
Hoffmann Manufacturing Co., Ltd. (179).
Hoyt Metal Co. of Great Britain, Ltd. (68).
Huggenberger, Dr. (51).
Hughes, Henry, & Son, Ltd. (84).
Hughes Johnson Stampings, Ltd. (199).
Humfrey-Sandberg (Sales), Ltd. (197).
Iliffe & Sons, Ltd. (106).
Imperial Airways, Ltd. (43).
Industrial Rubber Manufacturers, Ltd. (81).
Irving Air Chute of Gt. Britain, Ltd. (11).
Johnston, George, Ltd. (35).
Kelvin Bottomley & Baird, Ltd. (154).
K.L.G. Sparking Plugs, Ltd. (157).
Lane, G. & M., & Co. (164).
Light Production Co., Ltd. (149).
Lindley, C., & Co., Ltd. (133).
Lodge Plugs, Ltd. (18).
London Electric Firm (116).
Lundholm, C. H. (63A).
Marabini-Aviation (127).
Marconi's Wireless Telegraph Co., Ltd. (29).
Mee, F. J. (185).
Metal Propellers, Ltd. (9).
Meyrowitz, E. B., Ltd. (66).
Midland Motor Cylinder Co., Ltd. (155).
Mills, Wm., Ltd. (165).
Moseley, David, & Sons, Ltd. (117).
Mountford, Frederick (Birmingham), Ltd., (135).
National Benzole Co., Ltd. (6).
National Flying Services, Ltd. (75).
Negretti & Zambra (195).
Nobel Chemical Finishes, Ltd. (44).
North & Sons, Ltd. (82).
Palmer Tyre, Ltd. (45).
Phylax, Feuerlosch Automaten-Bau-Gesellschaft, M.B.H. (162).
Powerplus (1927), Ltd. (3).
Pyrene Co., Ltd. (67).
Ransome & Marles Bearing Co., Ltd. (40).
Redline Motor Spirit Co., Ltd. (39).
Reichsverband der Deutschen Luftfahrt-Industrie (56 and 57).
Reynolds Tube Co., Ltd. (163).
Richards, J., & Sons, Ltd. (146).
Rilevamenti Aerofotogrammetrici, Soc. Anon. (178).
Ripon Steel Co., Ltd. (114).
Rotherham & Sons, Ltd. (144).
Royal Aeronautical Society (222 to 229).
Rubery, Owen & Co. (5).
Ryland, Llewellyn, Ltd. (69).
S.A.B.E.N.A. (Soc. Anon. Belge d'Entreprises de Navigation Aerienne) (59).
Scintilla, Ltd. (46).
Shell-Mex, Ltd. (10).
Siebe, Gorman & Co., Ltd. (48).
Silvertown Lubricants, Ltd. (175).
Simms Motor Units, Ltd. (124).
Skefko Ball Bearing Co., Ltd. (159).
Smith, S., & Sons (M.A.), Ltd. (143).
Sozol (1924), Ltd., (128).
Specialloid, Ltd. (8).
Stanford, Edward, Ltd. (198).
Steel Nut & Joseph Hampton, Ltd. (80).
Stephens, J. H., Ltd. (188).
Sterling Metals, Ltd. (142).
Stevens, J. A., Ltd. (73).
Superflexit, Ltd. (183).
Swedish Aero Committee (169).
Tecalemit, Ltd. (76).
Temple Press, Ltd. (41).
Thompson Brothers (Bilston), Ltd. (77).
"Times," The (151).
Titanine-Emaillite, Ltd. (49).
Triplex Safety Glass Co., Ltd. (24).
Turner, Ernest (192).
United Steel Companies, Ltd. (75A).
Vacuum Oil Co., Ltd. (72).
Vickers-Armstrongs, Ltd. (85).
Wakefield, C. C., & Co., Ltd. (71).
Wellworthy, Ltd. (126).
Wild, Henry, Surveying Instruments Supply Co., Ltd. (200).
Williamson Manufacturing Co., Ltd. (186).
Zeiss, Carl (London), Ltd. (115).
Zenith Carburetter Co., Ltd. (136).

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WE ARE EXHIBITING AT THE AERO EXHIBITION AT OLYMPIA———STAND 187———[In Gallery.]

("FLIGHT" *Photograph*)

Main Building, Heston Air Park, where the King's Cup and Siddeley Trophy air races started and finished.

ALTHOUGH out of the 60 entries for this year's King's Cup Air Race—which took place on July 5-6 last—there were just 41 starters, the race was undoubtedly an exceptionally good one, thanks mainly to the efforts of the handicappers, Capt. W. Dancy and F. Rowarth. This was demonstrated by the fact that, in spite of very bad weather conditions over certain portions of the 1,169-mile course, the arrivals at Blackpool—the terminus of the first day's section—were, with one or two exceptions, recorded within an hour, and some were very close together.

The arrivals home on the second day of the first few were also fairly close. As to the results, these were quite thrilling, and the win was undoubtedly a popular one. This year's winner was Flying-Officer R. L. Atcherley (who flew under the name of "R. Llewellyn"), with Flight-Lieut. G. Stainforth as navigator—both members of this year's Schneider Trophy team—on a Gloster "Grebe" (Armstrong-Siddeley "Jaguar") entered by Sir Walter Preston, M.P., for Cheltenham. Atcherley averaged a speed of 150·3 m.p.h. for the complete course.

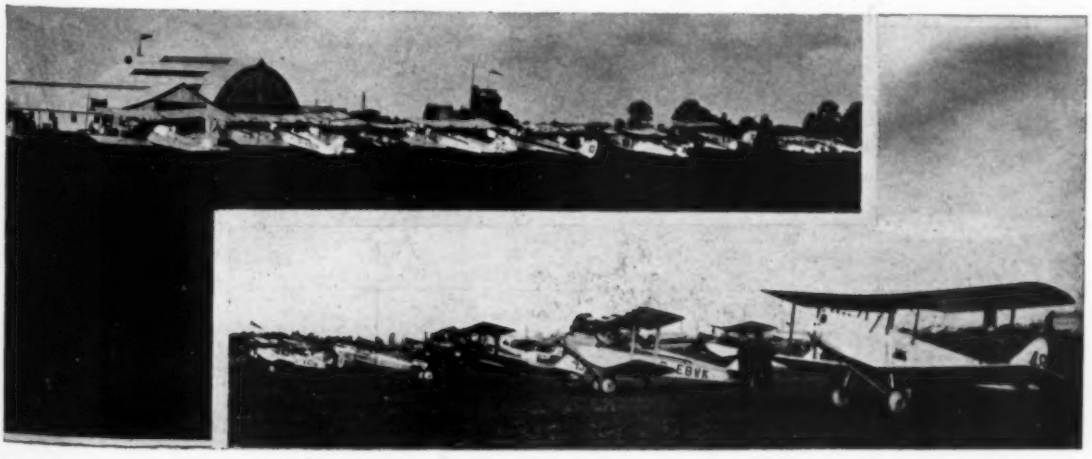
It was somewhat of an unexpected win—although "Llewellyn" was one of the favourites—for Neville Stack, who was flying an Avro "Avian IV M" fitted with the new Cirrus "Hermes" engine, was leading easily practically all the way home from Blackpool, having arrived there first the previous day. When some 70 miles from Heston, however, his engine began to fall off in power, so he landed at Bicester to see what was wrong.

After filling up with oil—the pressure had dropped—he set out once more, and with one cylinder out of action arrived back at Heston long after he was expected.

Second place in the King's Cup went to Lieut. L. G. Richardson, R.N.—a private owner, who, it will be remembered, flew to Malta in a light 'plane a little while back—flying his D.H. "Moth" with "Cirrus III" engine, in which he averaged 100·2 m.p.h. over the full course.

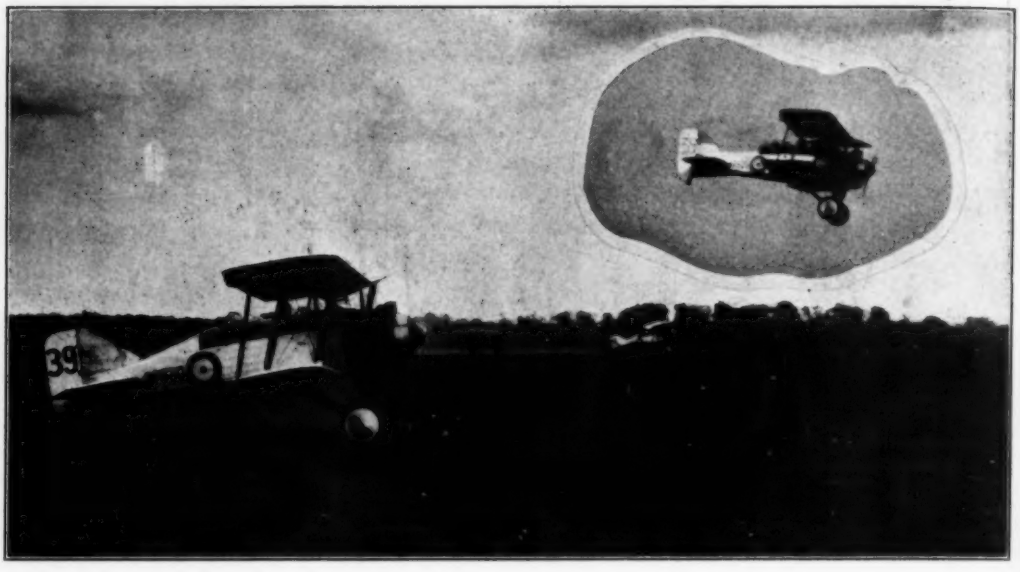
Lieut. Richardson was also first in the Siddeley Trophy Tour, the handicap race open to Light 'Plane Clubs, which was flown concurrently with the big event.

Third and fourth in the King's Cup came in shortly after, close together, and were respectively W. L. Hope—who won the cup last year—on his "Gipsy Moth," with an



("FLIGHT" *Photographs*)

KING'S CUP AND SIDDELEY TROPHY: Two views of the competing machines. Below, a line-up for the start.



("FLIGHT" *Photographs*)

THE KING'S CUP WINNER : Flight-Lieut. R. L. Atcherley ("Llewellyn") on the Gloster "Grebe" (Armstrong-Siddeley "Jaguar") entered by Sir Walter Preston, starting from Heston, and (inset) "crossing the line." The second "Grebe," with its entrant, the Hon. F. E. Guest, as passenger, and piloted by F./O. E. H. Fielden, is seen in the background.

average speed of 90·8 m.p.h., and A. S. Butler on his similar machine, with an average speed of 92·3 m.p.h. for the course. These two were, therefore, also second and third respectively in the Siddeley Trophy Tour.

Having thus summarised the result, let us now follow the progress of the race from start to finish. First, however, it might be as well to refer briefly to the course and other details of the race. It was a handicap race, over a course of 1,169 miles round Britain, divided into two daily sections, as follows :—

Section 1 (July 5).—London, Heston (Start); Henlow, Air station (turning point), 37 miles; Norwich, Mousehold Aerodrome (stop), 82 miles; Hadleigh Aerodrome (turning point), 44 miles; Hornchurch, Air station (turning point), 49 miles; Lympne Aerodrome (stop), 47 miles; Hamble Aerodrome (stop), 102 miles; Bristol, Filton Aerodrome (stop), 71 miles; Blackpool, Squire's Gate Aerodrome (stop), 163 miles. Total, 595 miles.

Section 2 (July 6).—Blackpool (start). Silloth (turning point), 75 miles; Renfrew Aerodrome (stop), 78 miles; Dunbar (turning point), 73 miles; Newcastle, Cramlington Aerodrome (stop), 72 miles; Leeds, Sherburn-in-Elmet Aerodrome (stop), 92 miles; Nottingham, Hucknall Aerodrome (turning point), 53 miles; Birmingham, Castle Bromwich

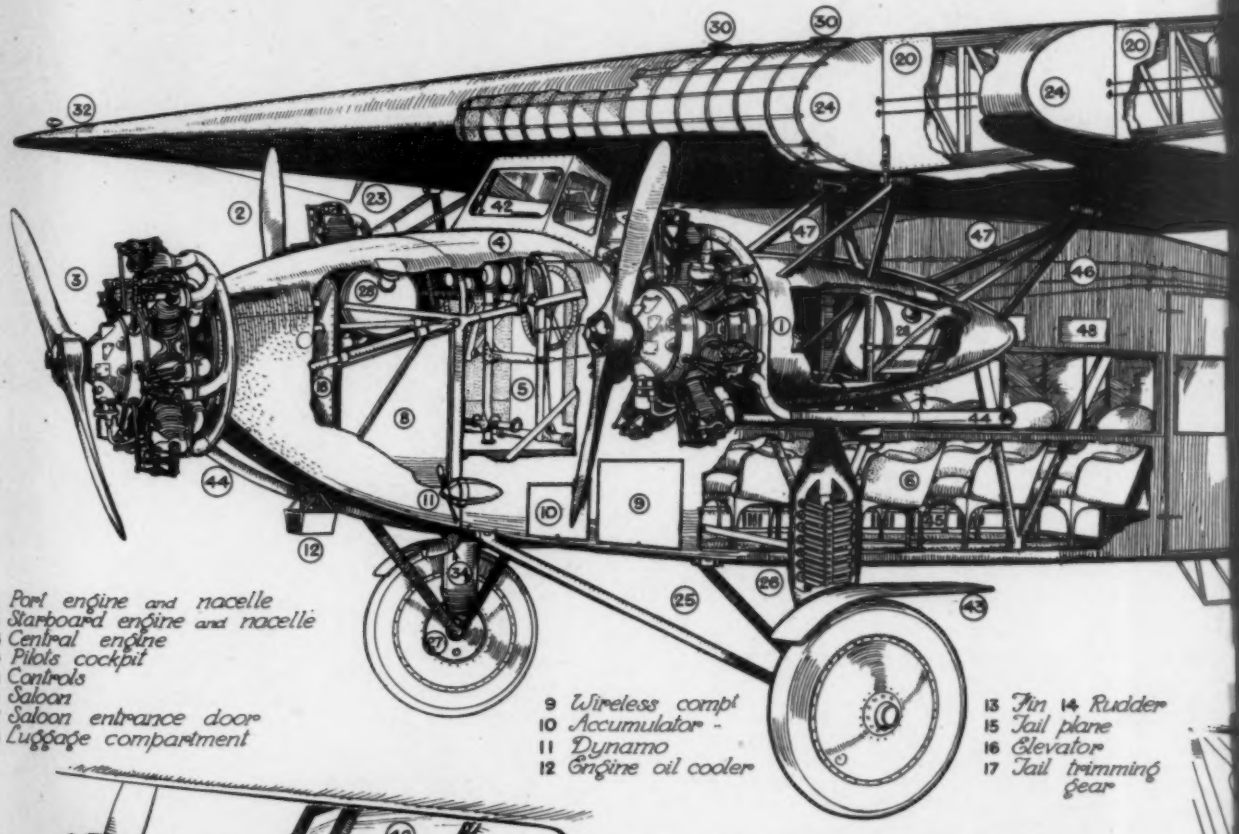
("FLIGHT" *Photographs*)

PRESENTATION : Lord Thomson, Secretary of State for Air, presenting (left) the King's Cup to Flight-Lieut. Atcherley (with Flight-Lieut. Stainforth), and (right) the Siddeley Trophy to Lieut. L. G. Richardson.

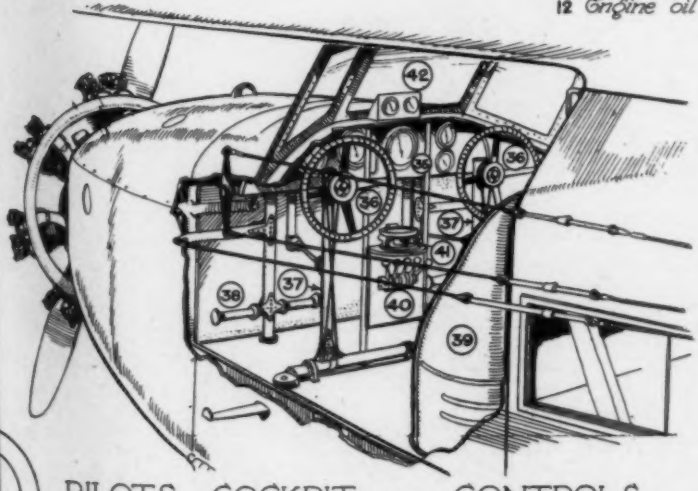
A MODERN PASSENGER—CAR

PART-SECTIONED PERSPECTIVE DRAWING SHOWING CHARACTERISTICS OF A DUAL CONTROL TRIPLE-ENGINE MONOPLANE

IN T
ACCO
PILOT



1 Port engine and nacelle
2 Starboard engine and nacelle
3 Central engine
4 Pilots cockpit
5 Controls
6 Saloon
7 Saloon entrance door
8 Luggage compartment
9 Wireless compt
10 Accumulator -
11 Dynamo
12 Engine oil cooler
13 Fin 14 Rudder
15 Tail plane
16 Elevator
17 Tail trimming gear



18 Fire proof bulkhead behind centre engine
19 Main plane
20 Front girder spar 21 Pitot tube
22 Rear girder spar 23 Ailerons
24 Ribs of plane
25 Under carriage struts
26 Under carriage shock absorbers
27 Wheel brake
28 Engine oil tanks 29 Tail skid
30 Twin petrol tank fillers
31 Port light 32 Starboard light
33 Tail light
34 Exhaust air heating apparatus
35 Instrument board
36 Control wheels for ailerons
37 Fore and aft control columns for tail elevator.
38 Rudder bar for rudder control
39 Pilots seat 40 Engine controls
41 Compass 42 Windscreen

43 Mu
44 Exh
45 Air
46 Ma
47 Stru
eng
ma
48 Sal

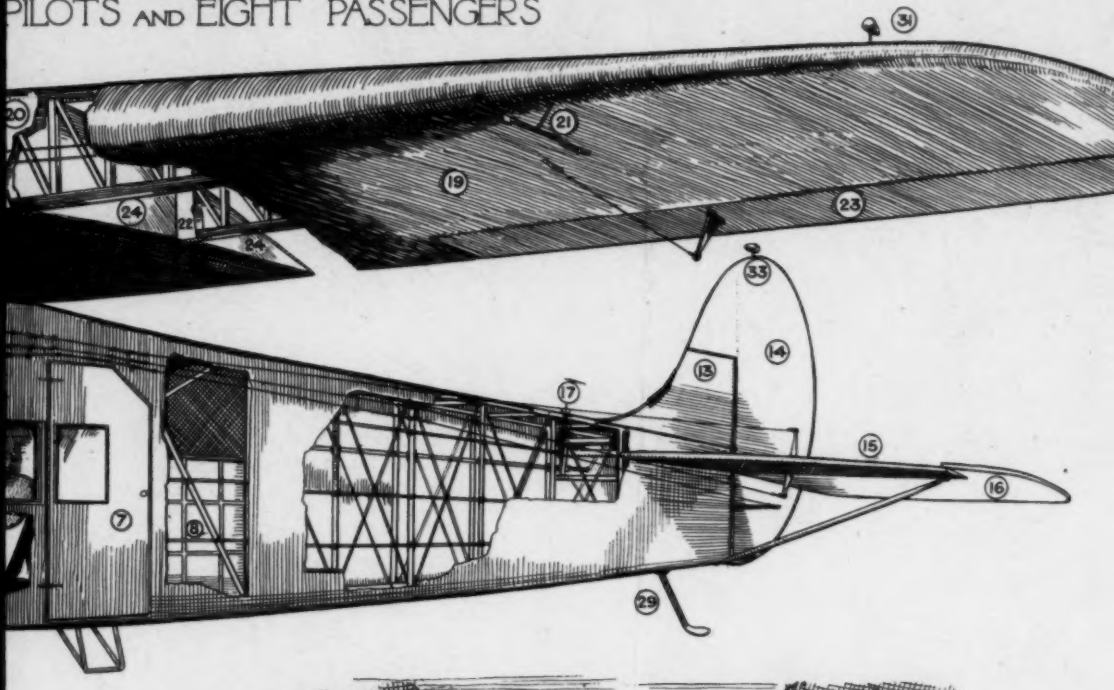
PILOTS COCKPIT AND CONTROLS

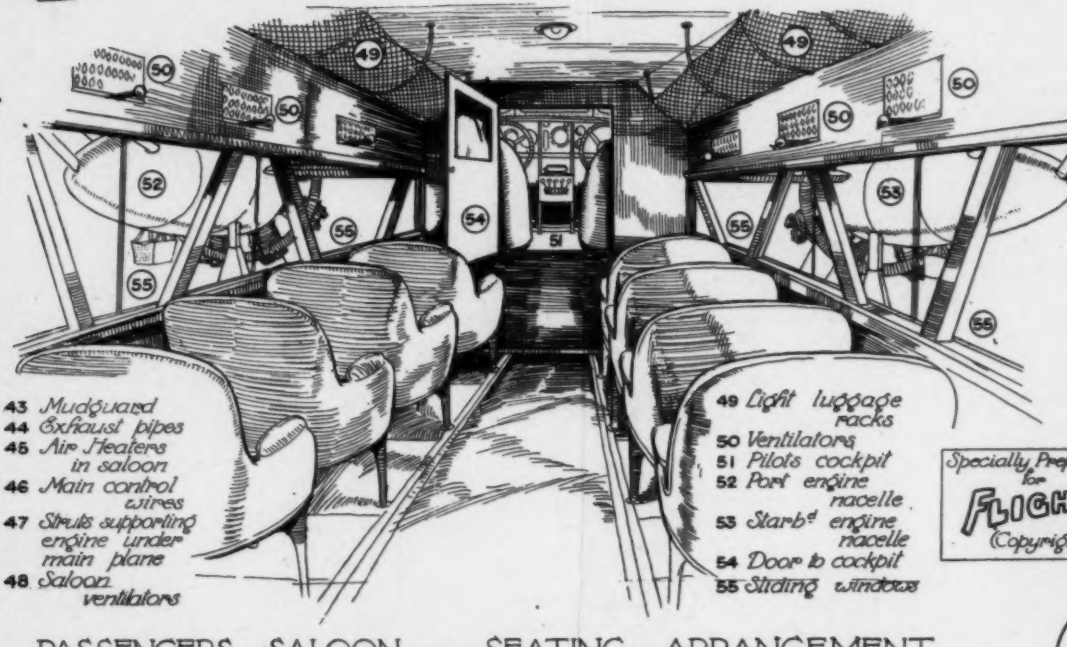
PA

Max A Miller

ARRIER

N THIS DESIGN THERE IS ACCOMODATION FOR TWO PILOTS AND EIGHT PASSENGERS





43 Mudguard
44 Exhaust pipes
45 Air Heaters in saloon
46 Main control wires
47 Struts supporting engine under main plane
48 Saloon ventilators

49 Light luggage racks
50 Ventilators
51 Pilots cockpit
52 Port engine nacelle
53 Starb^{d} engine nacelle
54 Door to cockpit
55 Sliding windows

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PASSENGERS SALOON AND SEATING ARRANGEMENT

Specially Prepared for
FLIGHT
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A MODERN PASSENGER CARRIER

SOME years ago Imperial Airways, Ltd., laid down the policy that all new aircraft to be placed on the regular air routes should be of the three-engined type, the great advantage of dividing the total power of the engines into three units being that in case of failure of any one of the three engines the machine is able to continue its flight on the remaining two. Even with two of the three engines out of action, a machine so equipped has a good choice of a field in which to land, as its flight path is inclined downward but very slightly, something of the order of 1 in 18 or so. This means that if the machine is flying at 1,000 ft., for example, and two of its engines cease to function, it can reach a field 18,000 ft., or nearly 3½ miles, away. If the machine is at 2,000 ft., it can reach a field 6¾ miles away, and so on.

Overleaf will be found a double-page picture, specially drawn for FLIGHT by Mr. Max Millar, showing in partly-sectioned view a modern commercial aeroplane fitted with three radial air-cooled engines. By breaking away the covering here and there, the artist has been able to show all the essential features of the machine, such as the internal structure, the passenger accommodation, the pilot's cockpit and controls, the engine installation, etc.

On the back page of this section of FLIGHT will be found a diagram illustrating the controls of an aeroplane, and the movements which the pilot has to make with his controls in order to cause the machine to climb, descend, turn and bank.

KING'S CUP RACE AND SIDD… TROPHY TOUR RESULTS
(Siddeley Trophy Competitors marked thus *). Half-an-hour stop at Controls.
FIRST DAY, JULY …

KING'S CUP RACE AND SIDDELEY TROPHY TOUR RESULTS

(Siddeley Trophy Competitors marked thus *). Half-an-hour stop at Controls.

FIRST DAY, JULY 5. SECTION 1. 589½ MILES

No. and Ident. Mark	Machine	Engine	Entrant.	Pilot	Handicap (1st Stage)	Start Heston	Norwich (119 miles) arr.	Lympne (141 miles) arr	Hamble (103 miles) arr.	Bristol (70·5 miles) arr.	Blackpool (157 miles) arr.	Order of Finish
					h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.	
*13 (EBOO) ..	H.A.C. 2 " Minus " ..	31 Cherub III .. —	C. H. Latimer Needham ..	G. R. Ashton	4 0 13	8 0 0	9 12 20	13 21 27	Retired Hamble	—	—	—
*30 (EAUM) ..	Avro Baby	60 Cirrus I	H. H. Leech	H. H. Leech	3 19 59	8 40 14	10 5 13	Retired	—	—	—	—
26 (AAGN) ..	Simmonds Spartan ..	85 Cirrus III	L. A. Strange	C. S. Staniland	2 46 28	9 12 15	10 9 39	12 36 8	14 41 0	16 5 21	18 14 45	6
5 (EBTH) ..	D.H. Moth X	75 Cirrus II	V. N. Dickinson	V. N. Dickinson	2 46 28	9 13 45	10 13 58	12 56 46	15 12 0	16 42 48	19 4 9	24
16 (EBXJ) ..	Avro Avian III	75 Cirrus II	H. J. V. Ashworth ..	H. J. V. Ashworth ..	2 46 28	9 13 45	10 40 58	13 32 30	Retired	—	—	—
28 (AAGY) ..	Simmonds Spartan ..	85 Cirrus III	T. B. Bruce	T. B. Bruce	2 46 28	9 13 45	10 13 0	12 44 19	14 58 0	16 27 12	18 43 22	17
47 (EBWX) ..	D.H. Moth X	75 Cirrus II	H. H. Balfour	H. H. Balfour	2 46 28	9 13 45	10 28 32	Retired Hornchurch		—	—	—
59 (AAMC) ..	Simmonds Spartan ..	85 Cirrus III	J. G. Peel	G. E. F. Boyes	2 46 28	9 13 45	10 13 11	12 44 7	14 49 0	16 26 1	Down Lydney	
17 (EBFP) ..	Simmonds Spartan ..	85 Cirrus III	J. Parkinson	R. W. Jackson	2 42 40	9 17 33	10 47 30	Retired	—	—	—	—
*29 (EBYJ) ..	D.H. Moth X	75 Cirrus II	H. R. Law	H. R. Law	2 42 40	9 17 33	10 46 49	13 26 11	15 39 0	17 21 16	19 37 11	28
41 (AACC) ..	Bluebird IV	85 Cirrus III	Master of Sempill	Master of Sempill	2 38 56	9 21 17	10 27 47	13 12 40	15 39 0	17 12 50	19 39 41	29
2 (EBRN) ..	Westland Widgeon III ..	75 Cirrus II	E. R. Manning	E. R. Manning	2 37 58	9 22 15	10 21 47	12 58 33	15 10 0	16 38 12	18 54 18	20
*10 (EBRM) ..	Westland Widgeon III ..	75 Cirrus II	R. G. Cazalet	R. G. Cazalet	2 31 43	9 28 30	10 25 59	12 56 28	Retired	—	—	—
*15 (EBPQ) ..	D.H. Moth	85 Cirrus III	L. G. Richardson	L. G. Richardson	2 31 43	9 28 30	10 23 54	12 46 44	14 45 0	16 8 41	18 15 53	7
11 (AAHB) ..	D.H. Moth G	85 Gipsy	E. Tiarks	F. L. Kimmins	2 23 6	9 37 7	10 34 27	13 2 16	15 9 0	16 37 10	18 58 14	21
60 (AAIV) ..	D.H. Moth G	85 Gipsy	B. E. Lewis	B. E. Lewis	2 23 6	9 37 7	Returned to Heston		—	—	—	—
* 4 (AAEW) ..	D.H. Moth G	85 Gipsy	D. S. Schreiber	D. S. Schreiber	2 21 24	9 38 49	10 34 25	12 57 53	15 2 0	16 30 37	18 43 14	16
*21 (AACO) ..	D.H. Moth G	85 Gipsy	J. W. P. Chalmers ..	J. W. P. Chalmers ..	2 21 24	9 38 49	10 36 41	13 8 18	15 12 0	16 46 4	18 59 50	22
38 (AAHO) ..	D.H. Moth G	85 Gipsy	L. St. Ingram	P. P. Grey	2 21 24	9 38 49	10 30 0	12 56 49	14 56 0	16 20 20	18 31 58	11
*43 (AADC) ..	D.H. Moth G	85 Gipsy	W. R. Bailey	W. R. Bailey	2 21 24	9 38 49	10 40 4	Retired Norwich		—	—	—
58 (EBVK) ..	D.H. Moth X	75 Cirrus II	G. Mackinnon	M. Brunton	2 21 24	9 38 49	Retired	—	—	—	—	—
48 (AAAT) ..	Avro Avian	85 Cirrus III	J. Barrett-Lennard ..	C. F. Le Poer Trench ..	2 19 45	9 40 28	10 34 59	12 54 57	14 35 0	16 18 10	18 29 5	10
* 9 (EBRQ ..	Westland Widgeon III ..	85 Genet	" J. Wellworth " ..	" J. Wellworth " ..	2 18 6	9 42 7	10 36 49	12 54 46	14 56 0	16 39 14	19 4 40	25
*27 (EBQN) ..	Avro Avian I	75 Cirrus II	P. N. G. Peters	G. Thorne	2 18 6	9 42 7	10 40 7	13 5 10	15 6 0	16 31 4	18 42 57	15
35 (AACL) ..	D.H. Moth G Coupé ..	85 Gipsy	A. S. Butler	Mrs. A. S. Butler ..	2 15 29	9 44 44	10 41 31	13 6 25	15 10 0	16 35 24	18 47 21	19
*12 (AAHG) ..	D.H. Moth G	85 Gipsy	A. F. Wallace	A. F. Wallace	2 13 17	9 46 56	10 45 19	13 12 28	15 18 0	16 47 34	18 59 53	23
* 3 (AADE) ..	Westland Widgeon III ..	85 Gipsy	C. S. Napier	C. S. Napier	2 11 41	9 48 32	10 52 31	13 28 57	15 47 0	Retired Hamble		—
*33 (AADX) ..	D.H. Moth G Coupé ..	85 Gipsy	A. C. M. Jackaman ..	A. C. M. Jackaman ..	2 11 41	9 48 32	10 44 51	13 4 47	15 3 0	16 26 35	18 37 58	14
(AAAA) ..	D.H. Moth G	85 Gipsy	G. de Havilland	G. de Havilland	2 11 41	9 48 32	10 45 15	13 5 57	15 5 0	16 27 58	18 36 24	12
*32 (AAAL) ..	D.H. Moth G	85 Gipsy	Miss W. E. Spooner ..	Miss W. E. Spooner ..	2 10 7	9 50 6	10 44 27	13 1 24	14 58 0	16 19 42	18 24 30	8
*37 (AADA) ..	D.H. Moth G	85 Gipsy	J. D. Irving	J. D. Irving	2 10 7	9 50 6	10 46 1	13 5 40	15 5 0	16 29 13	18 37 34	13
* 6 (AAEE) ..	D.H. Moth G. Coupé ..	85 Gipsy	Lady Bailey	Lady Bailey	2 8 33	9 51 40	10 48 5	13 14 23	—	16 59 14	19 10 11	26
1 (EBTO) ..	S.E.5a	120 Airdisco	W. L. Handley	T. Rose	1 56 38	10 3 35	10 59 55	Down Sittingbourne		—	—	—
49 (AAHJ) ..	Avro Avian IVm ..	105 Hermes	M. O. Darby	T. N. Stack	1 59 32	10 0 41	10 58 52	13 3 1	14 47 0	16 4 20	17 59 30	1
* 7 (AAPH) ..	D.H. Moth G	85 Gipsy	W. L. Hope	W. L. Hope	1 40 17	10 19 56	10 8 52	13 14 35	15 0 0	16 17 8	18 13 26	4
*34 (EBQH) ..	D.H. Moth G	85 Gipsy	A. S. Butler	A. S. Butler	1 35 12	10 25 1	11 13 38	13 18 53	15 3 0	16 20 15	18 14 17	5
20 (AAHR) ..	D.H. Moth G Coupé ..	85 Gipsy	Sir Chas. Wakefield ..	H. S. Broad	1 30 17	10 29 56	11 18 19	13 21 0	15 3 0	16 19 24	18 18 21	8
31 (EBQM) ..	S.E.5a	200 Viper	Duke of Northumberland	A. H. Wheeler	1 20 55	10 39 18	11 30 45	13 14 15	15 39 0	16 58 18	19 18 4	27
39 (J.7520) ..	Gloster Glebe	385 Jaguar	Sir Walter Preston ..	" R. Llewellyn " ..	0 33 43	11 26 30	12 2 29	13 48 54	15 39 0	16 27 52	18 0 2	2
40 (J.7519) ..	Gloster Grebe	385 Jaguar	Hon. F. E. Guest	E. H. Fielden	0 33 43	11 26 30	12 3 2	13 48 25	15 19 0	16 28 8	18 10 25	3
51 (EBNQ) ..	Vickers Fleet Fighter ..	490 Rolls-Royce F 11	Sir Robert McLean ..	H. J. Summers	Scratch	12 0 13	12 42 1	14 26 28	15 43 0	17 1 24	18 44 58	18

SECOND DAY, JULY 6. SECTION II. 579½ MILES

No. and Ident. Mark	Machine	Engine	Entrant	Pilot	Handicap (2nd Stage)	Start Blackpool	Glasgow (156 miles) arr.	Newcastle arr. (144½ miles)	Leeds arr. (91½ miles)	Birmingham arr. (95 miles)	Heston arr. (92½ miles)	Position. King's Siddeley Cup	Trophy.
					h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.	h. m. s.		
26 (AAGN) ..	Simmonds Spartan ..	85 Cirrus III	L. A. Strange	C. S. Staniland ..	2 43 39	8 0 0	—	—	13 20 6	15 0 12	16 26 30	2	1
*15 (EBPQ) ..	D.H. Moth	85 Cirrus III	L. G. Richardson ..	L. G. Richardson ..	2 29 9	8 14 8	10 6 46	12 6 0	13 18 37	14 45 11	16 38 22	6	—
49 (AAHJ) ..	Avro Avian IVm ..	105 Hermes	M. O. Darby	T. N. Stack	1 49 7	8 37 30	10 13 58	12 2 0	13 18 37	14 45 11	16 38 22	6	—
48 (AAAT) ..	Avro Avian	85 Cirrus III	J. Barrett-Lennard ..	C. F. Le Poer Trench	2 17 24	8 39 5	10 39 52	12 48 54	14 0 0	15 29 45	16 54 15	8	—
38 (AAHO) ..	D.H. Moth G	85 Gipsy	L. St. C. Ingram ..	P. P. Grey	2 19 1	8 40 21	11 27 2	13 29 58	14 52 12	16 24 48	17 50 29	18	—
*32 (AAAL) ..	D.H. Moth G	85 Gipsy	Miss W. E. Spooner ..	Miss W. E. Spooner	2 7 55	8 43 59	10 33 57	12 27 46	14 27 13	15 12 38	16 36 50	5	4
2 (ERBN) ..	Westland Widgeon III ..	75 Cirrus II	E. R. Manning	E. R. Manning ..	2 34 28	8 47 15	10 53 15	12 58 50	14 22 40	15 58 44	17 26 55	15	—
5 (EBTH) ..	D.H. Moth X	75 Cirrus II	V. N. Dickinson	V. N. Dickinson ..	2 43 39	8 48 23	—	—	Returned to Blackpool		—	—	—
*4 (AAEW) ..	D.H. Moth G	85 Gipsy	D. S. Schreiber	D. S. Schreiber ..	2 19 1	8 52 37	11 5 45	13 13 39	14 36 22	16 8 59	17 36 34	16	8
36 (AAAA) ..	D.H. Moth G	85 Gipsy	G. de Havilland	G. de Havilland ..	2 9 27	8 53 51	10 47 32	12 46 6	14 6 9	15 37 0	17 2 0	9	—
*27 (EBQN) ..	Avro Avian I	75 Cirrus II	P. N. G. Peters	G. Thorne	2 15 46	8 54 35	10 49 43	12 51 58	14 14 42	15 47 2	17 37 0	12	9
*33 (AADX) ..	D.H. Moth Coupé ..	85 Gipsy	A. C. M. Jackaman ..	A. C. M. Jackaman	2 9 27	8 55 55	10 50 27	12 51 35	14 14 53	15 46 57	17 11 14	11	6
*37 (AADA) ..	D.H. Moth G	85 Gipsy	J. D. Irving	J. D. Irving	2 7 55	8 56 30	10 47 45	12 46 38	14 7 21	15 39 10	17 5 9	10	5
35 (AACL) ..	D.H. Moth G Coupé ..	85 Gipsy	A. S. Butler	Mrs. A. S. Butler ..	2 14 11	9 0 34	10 57 17	12 57 8	14 19 40	15 52 34	17 17 34	14	—
*7 (AAPH) ..	D.H. Moth G	85 Gipsy	W. L. Hope	W. L. Hope	1 38 34	9 2 16	10 39 31	12 26 52	13 43 6	15 9 50	16 29 18	3	2
11 (AAHB) ..	D.H. Moth G	85 Gipsy	E. Tiarks	F. L. Kimmins ..	2 20 41	9 4 57	11 7 27	13 10 33	14 34 3	17 43 47	19 18 13	22	—
*34 (EBQH) ..	D.H. Moth G	85 Gipsy	A. S. Butler	A. S. Butler ..	1 33 35	9 8 6	10 42 4	12 29 22	—	15 9 57	16 29 26	4	3
*21 (AACO) ..	D.H. Moth G	85 Gipsy	J. W. P. Chalmers ..	J. W. P. Chalmers	2 19 1	9 8 43	11 12 14	13 13 14	14 37 11	16 12 21	17 38 43	17	10
*12 (AAHG) ..	D.H. Moth G	85 Gipsy	A. F. Wallace	A. F. Wallace ..	2 11 1	9 16 16	11 19 40	13 26 43	14 49 0	16 21 28	17 47 49	19	11
*9 (EBRQ) ..	Westland Widgeon III ..	85 Genet	" J. Wellworth " ..	" J. Wellworth " ..	2 15 46	9 16 18	11 3 40	13 2 40	14 21 36	15 50 59	17 13 22	13	7
20 (AAHR) ..	D.H. Moth G Coupé ..	85 Gipsy	Sir Charles Wakefield ..	H. S. Broad ..	1 28 45	9 17 0	10 50 6	14 18 34	15 34 35	17 7 25	18 25 32	20	—
41 (AACC) ..	Bluebird IV	85 Cirrus III	Master of Sempill ..	Master of Sempill ..	2 36 15	9 30 50	11 51 43	14 15 9	15 51 15	—	—	—	—
*6 (AAEE) ..	D.H. Moth G Coupé ..	85 Gipsy	Lady Bailey	Lady Bailey	2 6 23	9 31 12	11 27 48	14 7 29	15 32 13	17 4 57	18 30 16	21	12
39 (J. 7520) ..	Gloster Grebe	385 Jaguar	Sir Walter Preston ..	" R. Llewellyn " ..	0 33 9	9 58 40	11 12 47	12 50 19	14 0 0	15 12 20	16 25 59	1	—
40 (J. 7519) ..	Gloster Grebe	385 Jaguar	Hon. F. E. Guest ..	E. H. Fielden ..	0 33 9	9 59 57	11 16 34	12 55 28	14 6 9	15 27 18	16 40 48	7	—
51 (EBNQ) ..	Vickers Fleet Fighter ..	49 Rolls-Royce F.11 ..	Sir Robert McLean ..	J. Summers ..	Scratch	11 12 22	12 19 38	13 55 48	15 48 51	Retired	—	—	—

("FLIGHT" *Photographs*)

SECOND AND ALSO FIRST: Lieut. L. G. Richardson, second in the King's Cup and first in the Siddeley Trophy, starting from Heston (left) and finishing. Below, Richardson and Atcherley being greeted on landing at Heston.

Aerodrome (stop), 46 miles; London, Heston Aerodrome (finish), 95 miles. Total, 584 miles.

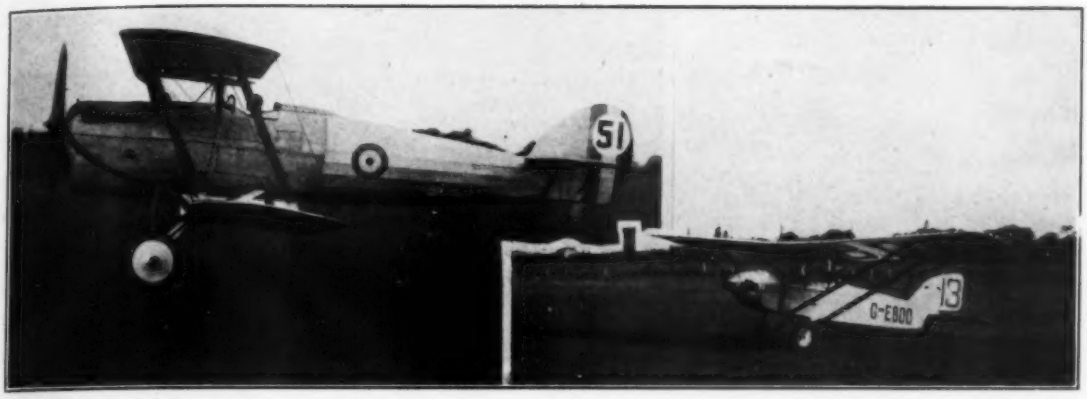
The stops at the controls were 30 minutes in each case.

The Start

Not very many people turned up to see the start of the race at Heston Air Park—London's newest aerodrome, which, incidentally, made this the occasion for its public début, and about which excellent aerodrome we have something further to say at the end of our King's Cup report. However, the size of the "crowd" increased somewhat as the morning advanced, and at 8 a.m. sharp, friend George Reynolds lowered his flag for the dispatch of the limit man. Flight-Lieut. G. R. Ashton, on the H.A.C. 2 "Minus" monoplane (Bristol "Cherub"). Weather conditions, it should be noted, were not particularly ideal—there being an exceptionally gusty wind, of from 25 m.p.h. upwards, blowing, together with threatenings of rain storms. Poor little "Geboo" got tossed about badly as it set out towards the north. The next starter, Pilot Officer H. Leech, and passenger, on the veteran Avro "Baby" (60 "Cirrus"), provided the first thrill, for he failed to rise sufficiently high to clear the aerodrome—landed hastily, and had another try. He only just succeeded in getting away, making a low, wide circuit outside the 'drome.

("FLIGHT" *Photographs*)

FIRST TWICE, NOW THIRD: Last year's winner, Capt. W. L. Hope, seen on the right, looks far from displeased, although he came in third for the King's Cup and second for the Siddeley Trophy. On the left, starting from Heston.



("FLIGHT" *Photographs*)

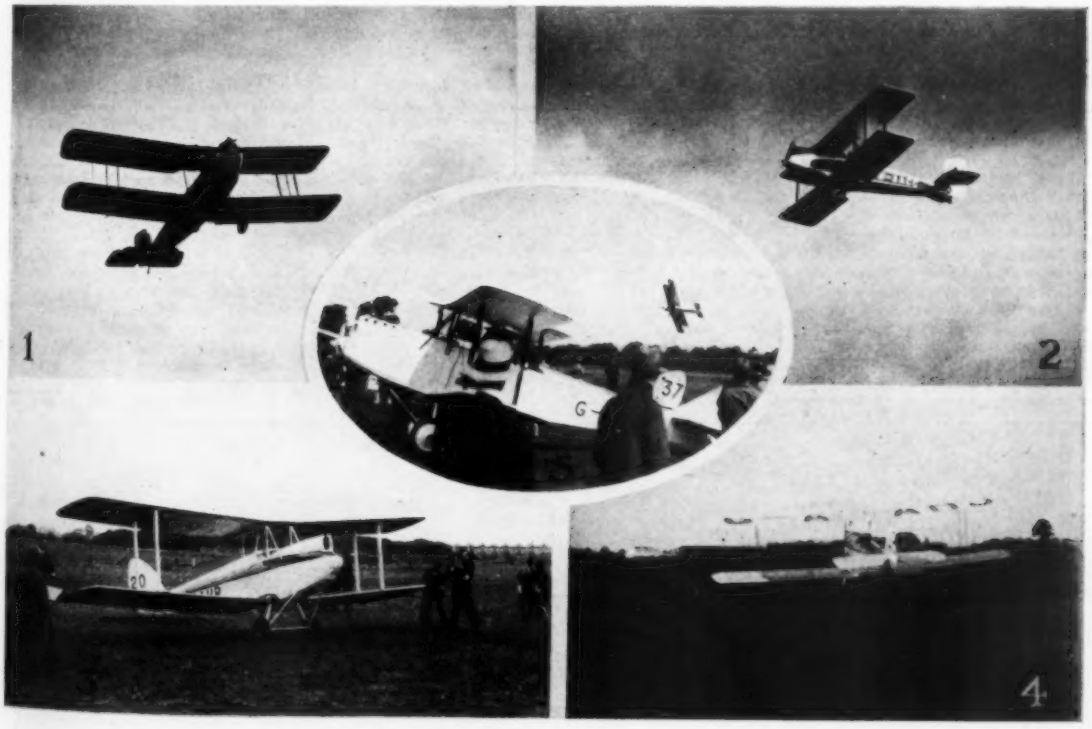
EXTREMES: Scratch man, F./O. J. Summers on the Vickers "Fleet Fighter" (Rolls-Royce F. 11), and limit man Flight.-Lieut. G. R. Ashton on the H.A.C.2 "Minus" (Bristol "Cherub") starting from Heston, with an interval of four hours between them!

After the third man, Flight-Lieut. C. S. Staniland—who was flying Lieut.-Col. L. A. Strange's Simmonds "Spartan" ("Cirrus")—got away in fine style; a little batch of five was dispatched. They all had the same handicap, and should have started together, but as the wind was from the south, and the course lay north, necessitating a sharp double-back turn, it was wisely decided to send them off at 30-sec. intervals, so as to avoid collisions.

We do not propose to record here each get-away in detail, as the times of starting, handicap allowances, etc., of all competitors for both days are set out in our table on page 653.

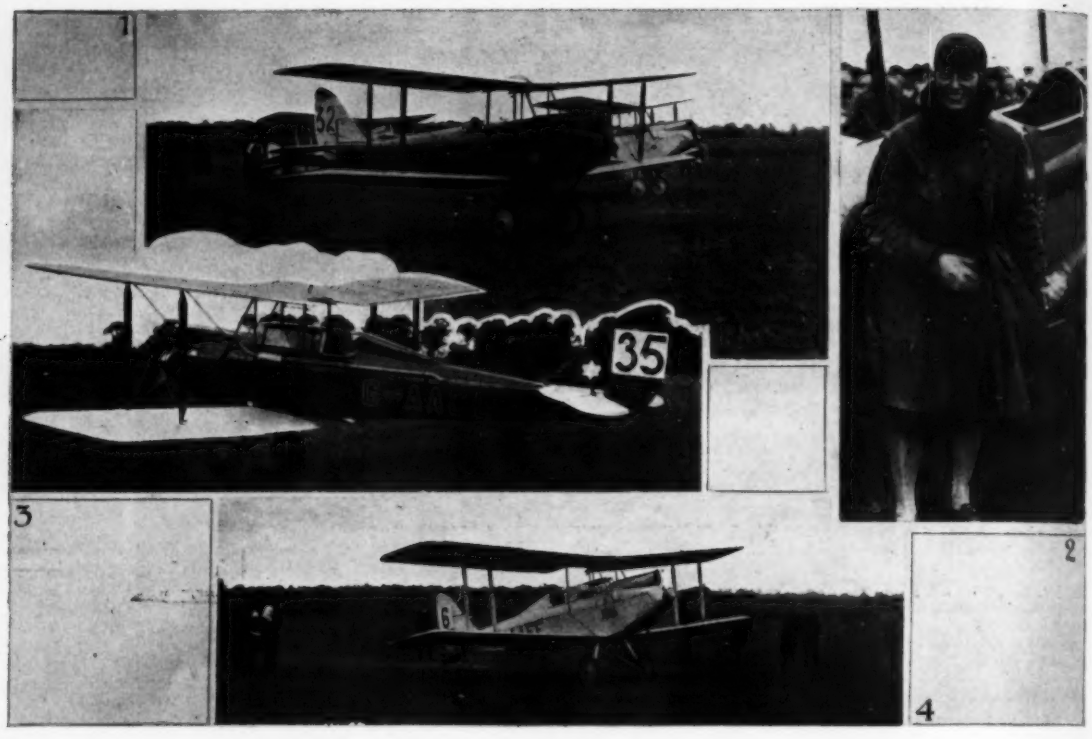
It may be said, however, that all got away without mishap, and reference may be made to one or two incidents concerning the start.

Most of the competitors got away singly, but there were a few pairs, and a batch of four "Moths," which once again went off at 30-second intervals—Nos. 4, 21, 38, 43 and 58. The pairs were—H. R. Low ("Moth X") and R. W. Jackson ("Spartan"); A. M. Kimmins and B. E. Lewis on "Moth G's" (smart get-away); G. Thorne ("Avian I") and "J. Wellworth" (an unfamiliar name but a familiar machine, "Widgeon G-EBRQ"!); Miss W. E. Spooner—who picked up her course in fine style—and J. O. Irving on "Gipsy Moths"; and the two Gloster "Grebes," piloted respectively by Atcherley and Fielden. Thorne and "Wellworth," by the



("FLIGHT" *Photographs*)

SOME OTHER COMPETITORS: (1) F./O. R. W. Jackson, on J. Parkinson's Simmonds "Spartan" ("Cirrus. III"). (2) Col. the Master of Sempill on his Blackburn "Bluebird IV" ("Cirrus III"). (3) Capt. H. S. Broad's beautifully streamlined D.H. "Gipsy Moth Coupé." (4) Capt. T. N. Stack, who nearly won, on the "Hermes-Avian." (5) Flight-Lieut. C. S. Staniland, on the Simmonds "Spartan" (in the air), who was "missing" after leaving Blackpool. J. D. Irving's "Gipsy Moth" in the foreground.



("FLIGHT" *Photographs*)

THE LADIES ! : (1) Miss W. E. Spooner starts on her "Gipsy Moth," and (2) arrives home fifth, but smiling. (3) Mrs. A. S. Butler in her Coupé "Moth G," and (4) The Hon. Lady Bailey in a similar machine, leaving Heston. All finished the course, and carried passengers.

way, not only took off together, but kept close company throughout the race, from start to finish. Each acting as the other's navigator, no doubt !

Four hours after the limit man had departed, the scratch man, F./O. J. Summers, on Sir Robert McLean's Vickers "Fleet Fighter" left. In the meanwhile reports from the other controls came in telling of the progress of the competitors, whilst an Imperial Airways Handley Page air liner chartered by Mr. Van Lear Black (and piloted, we believe, by Olley) set out, with Sir Sefton Brancker as one of the passengers, to follow the course.

Owing to pressure on our space this week, we must ask our readers to follow the arrivals of the competitors at the various controls from our table. Progress during the first day may, however, be summarised as follows. Several fell out on the way to Blackpool : Ashton (H.A.C.2) retired at Hamble ; Leech (Avro Baby) had engine trouble after reaching Norwich ; Ashworth (Avian) retired at Lympne with carburettor trouble ; Balfour retired at Hornchurch ; Cazalet (Widgeon) made a forced landing after leaving Hamble ; Lewis (Moth) gave up near Hadleigh and returned to Heston ; W. R. Bailey damaged his undercarriage at Norwich ; Brunton force-landed at Harrow and Jackson after leaving Norwich ; Napier retired at Hamble ; Rose had engine trouble and retired at Sittingbourne ; and Boyes retired with engine trouble at Lydney.

Stack obtained the lead at Bristol, with Atcherley close on his tail, while Summers, who had been catching up, lost a little after Bristol. Lt. Richardson was also making good progress up to Bristol, and then fell behind slightly.

Out of the 41 starters, therefore, 29 reached Blackpool, and of these 26 set out on the return journey to Heston the following morning—the three withdrawals being T. B. Bruce, H. R. Law, and A. H. Wheeler.

("FLIGHT" *Photographs*)

HULLO, TWINS ! : F./O. G. Thorne on the Avro "Avian I" ("Cirrus II") and "J. Wellworth" on the Westland "Widgeon III" ("Genet"), who started together, flew the course together, and finished together !

RIVALS, AND A METAL PROPELLER : Left, Mr. and Mrs. A. S. Butler, who each piloted a D.H. "Moth" in the King's Cup. Mrs. Butler only just recently obtained her "ticket." On the right, Capt. H. H. Balfour, who flew his D.H. "Moth X," fitted with a Metal Propeller.

The Finish

The first man to leave Blackpool was Staniland on the "Spartan"; this was the last that was heard of him until late that night. He had to make a forced landing in Lanarkshire, 20 miles from Glasgow.

Another competitor, V. N. Dickinson, returned to Blackpool shortly after leaving, so that there were now 24 left in the race. All had a rough time of it over the Scotch hills; Broad, one of the favourites, got trapped in a rain-swept valley and after trying to get out landed, where he waited two hours before he could start again. Lady Bailey, Mrs. Butler, and J. W. P. Chalmers (with Mrs. Chalmers) also lost time on this section.

The Master of Sempill, who was experiencing trouble with his engine, gradually lost ground, and finally retired at Leeds, where he "borrowed" another machine to resume his journey to London, where he arrived in time to broadcast a "fly-witness" account of the race through the B.B.C.

Another "casualty" was Fielden on the second Gloster "Grebe," entered by the Hon. F. E. Guest (who was a passenger), which was close to Atcherley's "Grebe" until just outside Birmingham, when a flying wire broke. This was replaced at Castle Bromwich, but valuable time was lost thereby. Summers, who, for some reason or the other, was not coming up to "scratch," retired at Leeds.

We will now return to Heston and receive the arrivals. After Lord Thomson had declared the new Air Park open, it was announced that the winner (? Stack) would arrive at any moment. All eyes were fixed towards an approaching rain-storm, without result (except for a false alarm in the shape of a D.H.9), and it was apparent that "something" had happened to Stack. Then, at 4.25 a machine loomed out of the clouds. It was Atcherley, and as he crossed the line, a second machine was seen over the trees—to wit, Richardson. While both were being mobbed and photographed on landing, two more came in, Hope and Butler. Some seven minutes later Miss Spooner came in, with Stack, and a badly missing engine, two minutes later. After this, the others came in at varying intervals until the last man, Kimmins, at 7.18 p.m. Thus, out of the original 41 starters, 22 returned home.

HESTON AIR PARK'S DÉBUT

("FLIGHT" *Photograph*)

Lord Thomson watched the King's Cup arrivals from the Control Tower at Heston Air Park.

QUITE apart from the paramount interest in the progress and finish of the King's Cup Race on Saturday the day at Heston was full of attraction from many sources. Of most significance was the official opening of Heston Air Park. The day was also one of social importance, for the aviation community was widely represented, and the officers of the Household Brigades and their friends were present to witness their own landing competition as well as the public events. Then, of course, Heston Air Park is their flying headquarters. The Air Park buildings had been made presentable and habitable in remarkably quick time, for only two or three weeks ago they were in hiding beneath scaffolding and the dust of dry cement. Their emergence from these obstructions revealed in particular the attractive, original style of the central social and administrative structure, and the capacious and convenient design of the large hangar.

Admirable features of the central building are the numerous vantage points for witnessing events on the aerodrome. Apart from the large balconies on the first floor of each wing there are smaller balconies on other levels, whilst each room gives wide and immediate views from large windows which, incidentally, provide another good feature in flooding each room with full daylight. On the ground floor are the restaurant and lounge, divided by the entrance from the aerodrome, and also overlooking the full width of the aerodrome.

In summarising the effect of this architectural style for its particular purpose one feels that it quite succeeds; it offers comfort, convenience and a very bright environment. It has the points to make it popular. To take Saturday's events in their proper sequence, including those arranged or those that were merely incidentally contributed, one must first mention an aerobatic performance given on an Avro-Lynx during the morning by Flight-Lieut. Oliver. The conditions were very gusty at the time, but he performed long inverted dives or glides, series of loops, horizontal inverted flying with turns, crazy ground flying and slow rolls.

Landing Competition

After lunch the Household Brigade Flying Club held their landing competition for the Gwynn Madock's Cup. The judge was Mr. Nigel Norman, one of the directors of Airwork, Ltd.

Each competitor had to attempt a landing in a white circle from 500 ft. with the engine throttled down. An observer flew in the rear cockpit to ensure that the engine was not used.

Each competitor won five marks for the approach and (with the exception of Capt. T. Rhodes and Lieut. R. L. Preston), 20 marks for landing. The two officers mentioned each received 15 marks. Lieut. R. Quilter won the event splendidly. He landed within 8 in. of the stick and was awarded 100 marks. Lieut. E. Somerset was second with 92 marks. He landed within 8 yards of the stick. Third place went to Lieut. A. V. C. Douglas with 78 marks (landing distance 44 yards). Lieut. E. L. Donner was fourth with 71 marks (58 yds.), Lieut. R. L. Preston fifth with 44 marks (104 yds.), Capt. T. Rhodes sixth with 30 marks (130 yds.), and Lieut. W. R. West seventh with 29 marks (142 yds.). Vicountess Elibank presented the cup to Lieut. R. Quilter, the winner.

Official Opening

At 3.45 p.m. two yellow "Moths" belonging to the London Aeroplane Club appeared over the aerodrome flying low in line ahead formation and circled the buildings closely, then landed. In the leading machine was Lord Thomson (Secretary of State for Air), piloted by Maj. H. G. Travers, chief instructor of the London Aeroplane Club. Lord Thomson was received by Mr. Nigel Norman and Mr. F. A. I. Muntz, Airwork, Ltd., directors, Mr. H. C. Nias, chairman of the District Council, Sir Sefton Brancker, Col. M. O. Derby, Col. Mervyn O'Gorman and Maj. R. H. Mayo. The Air Minister then went to the Control Tower and announced the opening of the Air Park in a short appropriate speech which was drowned by the noise of a D.H. "Moth" performing crazy flying. Mr. Nigel Norman responded briefly, but in very generous terms of the Air Minister's presence on the occasion, and declared they were proud to have him introduce the Heston aerodrome. Mr. H. C. Nias also made a short but happy speech on behalf of the District Council in which he thanked Lord Thomson for kind references to them, and wished the aerodrome every success. These speeches were relayed to the public through loud speakers.

Following this ceremony everyone then waited in suspense for the eminent arrival of the King's Cup winner from the north-west, where black clouds were gathering and rain was falling. There were a few amusing incidents when a machine was sighted in the north-west or north, and the announcer warned the public that the winner was approaching. All got a grip on their hats ready to wave and voices cleared for cheering until the machines revealed their identity as non-competitors.

When the winning Gloster "Grebe" flown by Flying Officer R. L. Atcherley and Flight-Lieut. Stainforth dived in, the effect was dramatic, as everyone was reconciled to a victory by Capt. Neville Stack on the "Hermes Avian," for he had in hand a lead which no competitor could reach, short of a mishap to Stack—which, unluckily, happened.

The rest of this interesting day was adequately filled with the intermittent arrivals of the competitors and listening to their experiences.

("FLIGHT" *Photograph*)

Lord Thomson, Secretary of State for Air, flew to Heston in a L.Ae.C. "Moth," piloted by Maj. H. G. Travers.

("FLIGHT" *Photograph*)

AIR MINISTER AT HESTON: Lord Thomson (fourth from left) was received by (left to right) Col. M. O. Darby, Mr. Nigel Norman, Col. M. O'Gorman, Mr. F. A. I. Muntz, Sir Sefton Brancker, and Maj. R. H. Mayo.

The Southern Cross

DURING the past week the *Southern Cross* monoplane made excellent progress on its flight from Australia to England. One of the objects of this flight, which started on June 25 from Sydney, Australia, was to beat the record time of 15¼ days set up by Sqdr.-Ldr. "Bert" Hinkler in his Avro "Avian." The leader of the crew is Sqdn.-Ldr. Kingsford-Smith, and the machine is a Fokker monoplane fitted with three Wright "Whirlwind" engines, which the same pilot flew the Pacific in last year. It reached Calcutta on July 2 and left there the next morning with the intention of flying non-stop across India to Karachi, but owing to a slight defect it was obliged to land at Allahabad about mid-day. On July 4 it continued the flight and arrived at Karachi. The next stage to Bunder Abbas was flown the following day, and then it reached Baghdad in the afternoon on July 7. Athens was reached on July 8 after a direct flight from Baghdad, during which strong head winds were encountered, delaying the arrival by over two hours. The next stage—to Rome—was flown on July 9. The following morning the airmen left Rome for Croydon, where they arrived safely.

Victim of the Southern Cross

LIEUT. KEITH ANDERSON, who lost his life in the Australian bush whilst searching for the then missing *Southern Cross* monoplane, was buried in Sydney on July 6 with full military honours. Twenty aeroplanes circled over the grave during the burial.

Another Atlantic Flight

THE latest machine to fly the Atlantic from West-to-East is the *Pathfinder* monoplane (Bellanca), flown by Mr. R. Q. Williams and Mr. L. A. Yancey. They started from Old Orchard, Maine, on July 8, covered 3,500 miles in 31 hrs. 21 mins., and landed near Santander on the coast of Spain, owing to petrol shortage. They had hoped to reach Rome non-stop, and they intend proceeding there now. Nearly 500 gallons of petrol were consumed during the flight, and unfavourable weather was encountered part of the way. Soon after leaving America a fog bank 1,000 miles long enveloped them. These two airmen made repeated but unsuccessful attempts to make this flight a few weeks ago, and finally crashed their original machine.

Italian Visitors for Schneider Trophy Race

THE Auto Club of Italy is, it is stated, arranging to send a party of 400 members to see the Schneider Trophy Race in the Solent in September.

French Attempt on Record

MME. LENA BERNSTEIN left Istres on July 5 in a light 'plane to attempt a duration record for that class of aircraft. The direction of her flight was planned towards Scandinavia, but if the weather was unfavourable it was her intention to turn towards Tripoli, a distance of 1,250 miles.

New Flight to Europe Starts

A MACHINE named the *Untin Bowler* left Lake Michigan on July 3 to commence a flight to Berlin via the northerly route which touches at Greenland and Iceland. The crew were Mr. R. Gast and Mr. Parker Cramer. No news of it came through for several days. However, on July 9 it arrived at Port Barnwell, Labrador.

Spain Honours H.M.S. "Eagle" Officers

THE five officers of the aircraft-carrier H.M.S. *Eagle*, who have been fêted in Madrid for the rescue of the Spanish Atlantic airmen, were invested with Spanish decorations on July 6 at the Ministry of Marine.

Capt. N. F. Laurence (Captain of the *Eagle*) received the Grand Cross of the Order of Naval Merit. The medal of the Order of Naval Merit (2nd class) was awarded to Lieut.-Com. H. A. Taylor, Engr.-Com. W. F. Paffett and Wing-Com. R. M. Field. Lieut. R. A. Kilroy, of No. 402 Fleet Air Arm Flight (who was the first officer of the *Eagle* to sight the Spanish airmen), received the Cross of the Order of Naval Merit (1st class). The ceremony was attended by General Primo de Rivera, the Prime Minister, the Ministers of the Army and Marine, the British Chargé d'Affaires and several Spanish generals and admirals and leading airmen.

Capt. Laurence and his officers lunched with the Queen of Spain the day previous and were the guests of the Municipality and Aero Club of Seville. A reception in their honour was arranged in the evening at the British Embassy, and it was followed by a fête at the Royal Polo Club.

Record Indian Air Mail

LAST Saturday a record air mail for India left Croydon on the Imperial Airways' service to Karachi. It consisted of approximately 25,000 letters. In addition to the mail 14 passengers were on board, bound for various points along the route.

The Right Way

MISS JENNIE LEE and Miss Ellen Wilkinson, both Socialist Members of Parliament, flew from Croydon to Doncaster on July 5 to perform the opening ceremony of a new coalite carbonisation works.

French Military Air Display

AN air display was given on July 7 by the French 34th Regiment of Aviation. Many types of military machines were on view, and every phase of military aviation was exhibited. Decorations were presented during the afternoon by Col. Assolant to the French airmen, who recently flew the Atlantic in the Bernard monoplane, one of whom was his son. This air display took place at Le Bourget.

New Refuelling Record

ON July 6 a new record for endurance flight with refuelling was completed in America. The time in the air was 174 hrs. 59 secs., made by Mr. R. Mitchell and Mr. B. K. Newcomb, in a Stinson Detroiter monoplane styled *City of Cleveland*, and the flight took place over Cleveland. This record exceeds the previous time by 1 hr. 29 mins.

Canadian University Pilots

ABOUT forty students from Canadian Universities are this year qualifying for pilots in the holiday classes for flying held by the Department of National Defence at Ottawa.

Light 'Plane Record Claimed

ON July 8, Mr. W. S. Zimmerley flew from Brownsville, Texas, to Winnipeg, a distance of 1,725 miles, in 16 hrs., which is claimed as a record non-stop flight for light aeroplanes in a straight distance.

East African Aviation

A COMPANY styled "The Wilson Airways" has been formed to operate flying services in East Africa. The controlling financial interest is held by Mrs. F. K. Wilson, widow of a Kenya settler, and Mr. T. Campbell Black is manging director. A de Havilland Gipsy-Moth has been delivered to them, and a Westland three-engined cabin monoplane and an Avro three-engined cabin monoplane have been ordered.

Gipsy Engine's 500 Hrs.

THE Gipsy-Moth which has been engaged on a reliability tour with its engine sealed for this last few months, has completed nearly 500 hrs., and covered over 40,000 miles. It is still flying strongly, despite the fact that it has not been touched, except for normal routine external attention. The only replacement that has so far proved necessary has been one magneto. The machine was flown on many stages of the King's Cup course on Friday and Saturday, carrying spares in case the fleet of Moth competitors required them.

Madrid-Paris Air Line

A ONE-DAY return air service between Madrid and Paris with a stop at Biarritz will commence at the end of this month, according to a report to hand.

Super Dornier Flying-Boat Ready

REPORTS are to hand of the completion of the large Dornier flying-boat named *Dux* reputed to carry 120 passengers over a range of 600 miles. It has taken 2½ years to construct on the Swiss side of Lake Constance, and its trials are expected to take place there shortly. This is the craft that has been dealt with in FLIGHT, and was described by Herr Dornier in his Paper read before the R.Ae.S. last April (see FLIGHT for May 3).

Last "Argosy" Delivered

IMPERIAL AIRWAYS, LIMITED, took delivery of the last of their new fleet of Armstrong Whitworth "Argosy" air liners on July 9.

PRIVATE FLYING

A Section of FLIGHT in the Interests of the Private Owner, Owner-Pilot, and Club Member

PRIVATE OWNER'S SUCCESS IN THE KING'S CUP AND SIDDELEY TROPHY RACES

THE success of Lieut. L. G. Richardson, R.N., in winning second place in the King's Cup Race on Saturday and first place in the Siddeley Trophy Race was as popular with the private owners, with whom he is numbered, and light 'plane pilots generally, as was the triumph of Flying-Officer R. L. Atcherley with the entire aviation community. Lieut. Richardson is not a frequent competitor in air events, which fact introduced a note of pleasant surprise to his success. For two years he has been a private owner, having registered his Cirrus-Moth G-EBPQ in May 1927. Most of his vacations from the Navy have been spent air touring with his brother, Mr. E. W. A. Richardson, as passenger. During one summer vacation he flew to Malta and returned, and recently during a week's leave toured French Chateaux. He learned to fly with the London Aeroplane Club, of which he is still a member. In the King's Cup Race he flew solo and covered the course at an average speed of 100·2 m.p.h. His engine is Mark III Cirrus.

Miss Winifred Spooner's performance was again highly praiseworthy. True, she was two places behind her position in last year's race, but the weather conditions were far worse this year. Incidentally, she has only just recovered from the severe injuries she recently received when her Gipsy-Moth started prematurely owing to a damaged throttle, and it did not help matters when Miss Spooner, during the race, received a bad knock on the jaw from the cockpit edge during a bump. Her average speed for the whole King's Cup course was 111·1 m.p.h., and she finished fifth, eleven minutes only after F./O. Atcherley

Mrs. A. S. Butler, who has only quite recently learned to fly, was beaten by her husband, Mr. A. S. Butler, but she finished 14th. Both flew Gipsy-Moths. Lady Bailey also completed the course, in spite of the difficulties of bad visibility over the hills, which forced Capt. H. Broad down. Thus, all three lady competitors got home.

Capt. de Havilland, whose son accompanied him in the Gipsy-Moth Coupé, arrived 9th, Mr. A. C. M. Jackaman on the same type of machine was 11th, Mr. J. " Wellworth " on the " Widgeon III " was 13th ; Wing-Commander E. R. Manning, another " Widgeon III " owner, was 15th, whilst the following Gipsy-Moth owners, Mr. D. S. Schreiber, Mr. J.W. P. Chalmers and Mr. A. F. Wallace, finished 16th, 17th, and 19th respectively. Altogether, sixteen private owners flew the whole course of 1,169 miles. One who was obliged to fall by the wayside was Mr. R. G. Cazalet, the " Widgeon III " owner, who has won a reputation for winning arrival competitions at air meetings. He came down at Pullborough, but he returned to Heston and witnessed the end of the race.

As there was such a fleet of D.H. " Moths " competing, fitted with the Gipsy or Cirrus engine, it was necessary to organise service facilities during the race. A D.H. 9 J. (Jaguar) was therefore flown right round the course by Capt. C. A. Pike, of the De Havilland School of Flying, carrying spares and tools in quantities, from propellers to a gallon of dope and a reel of thread. This machine began its career during the war and has since been in active service in civil aviation, having begun with photographic work, then passing to air-taxi flying. It is now engaged on school work. The Gipsy-Moth, piloted by Mr. Tyler, the De Havilland acceptance pilot, which has been engaged on a reliability tour for months, also visited many stopping places in case of need. Both pilots found " trade " very bad, and in view of Capt. Pike's performance it seemed a pity that his old machine was not entered in the race !

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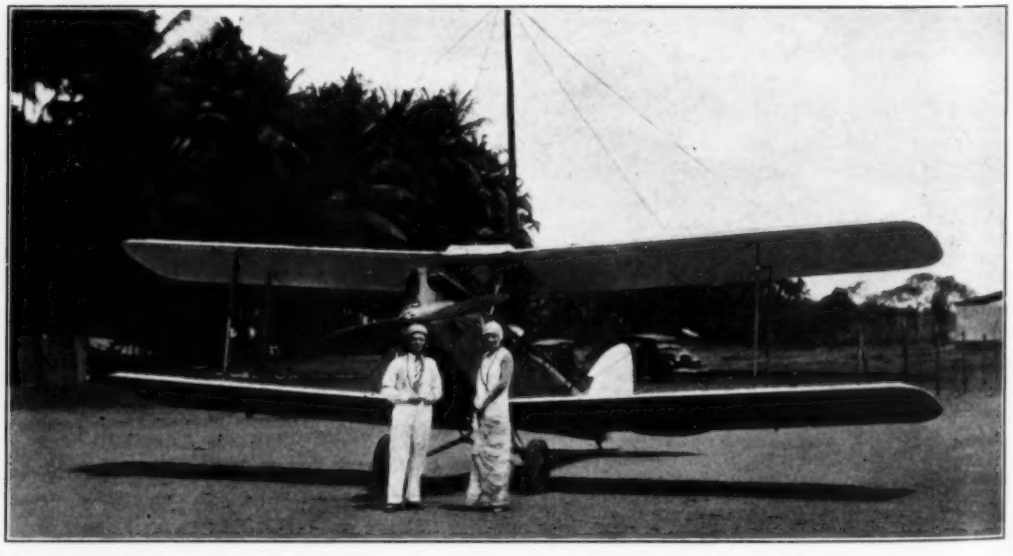

The first lady in India to obtain the pilot's " A " licence is Mrs. Petit, here seen with her instructor, Mr. E. D. Cummings, who is instructor to the Bombay Flying Club, which operates exclusively on D.H. " Moths."

LIGHT 'PLANE CLUBS

London Aeroplane Club, Stag Lane, Edgware, Sec., H. E. Perrin, 3, Clifford Street, London, W.1.

Bristol and Wessex Aeroplane Club, Filton, Gloucester. Secretary, Major G. S. Cooper, The Aerodrome, Patchway, Glos.

Cinque Ports Flying Club, Lympne, Hythe. Hon. Secretary, R. Dallas Brett, 114, High Street, Hythe, Kent.

Hampshire Aero Club, Hamble, Southampton. Secretary, H. J. Harrington, Hamble, Southampton.

Lancashire Aero Club, Woodford, Lancs. Secretary, Mr. Atherton, Avro Aerodrome, Woodford.

Liverpool and District Aero Club, Hooton, Cheshire. Hon. Secretary, Capt. Ellis, Hooton Aerodrome.

Midland Aero Club, Castle Bromwich, Birmingham. Secretary, Maj. Gilbert Dennison, 22, Villa Road, Handsworth, Birmingham.

Newcastle-on-Tyne Aero Club, Cramlington, Northumberland. Secretary, John Bell, Cramlington Aerodrome, Northumberland.

Norfolk and Norwich Aero Club, Mousehold, Norwich. Secretary, G. McEwen, The Aerodrome, Mousehold, Norwich.

Nottingham Aero Club, Hucknall, Nottingham. Hon. Secretary, Cecil R. Sands, A.C.A., 30, Park Row, Nottingham.

The Scottish Flying Club, 101, St. Vincent Street, Glasgow. Secretary, George Baldwin, Moorpark Aerodrome, Renfrew.

Southern Aero Club, Shoreham, Sussex. Secretary, Miss N. B. Birkett, Shoreham Aerodrome, Sussex.

Suffolk Aeroplane Club, Ipswich. Secretary, Maj. P. L. Holmes, The Aerodrome, Hadleigh, Suffolk.

Yorkshire Aeroplane Club, Sherburn-in-Elmet, Yorks. Secretary, Lieut.-Col. Walker, The Aerodrome, Sherburn-in-Elmet.

LONDON AEROPLANE CLUB

(REPORT FOR THE MONTH OF JUNE).—Instructors: Major H. G. Travers and Captain F. R. Matthews. Ground Engineers: C. Humphreys and A. E. Mitchell. Aircraft: The following machines were in commission: G-AABL, G-AABN, G-EBXS, G-EBXC, G-AAEX and G-EBWY.

Total flying time for the month of June: Flights, 889; time, 364 hrs. 45 mins.

This constitutes a record for the club.

"A" licences.—During the months of May and June, nineteen members qualified for their "A" licences.

Club aircraft: The club has recently purchased D.H. Moth Cirrus II G-EBWY. This brings the fleet of club machines up to six.

Subscriptions: Members are reminded that their annual subscriptions fell due on July 1. Flying membership £3 3s., associates £1 1s. Subscriptions should be sent to London Aeroplane Club, 3, Clifford Street, London, W.1.

Siddeley Challenge Cup.—The London Aeroplane Club wins the Siddeley Challenge Cup for the second time. Lieut. L. G. Richardson, R.N., a member of the club, who got 2nd place in the King's Cup, was placed first in the race for the Siddeley Challenge Cup. Last year the club became the holder, when Miss Winifred Spooner was our representative.

BRISTOL & WESSEX AEROPLANE CLUB, LTD.

(JUNE 30–JULY 6).—Pilot instructor: E. W. B. Bartlett. Ground engineer A. W. Webb. Machines in commission (3), TV, YH, XF; flying time for the week, 24 hrs. 20 mins.; pupils instructed (13), 13 hrs. 50 mins.; soloists (2) 1 hr. 10 mins.; licensed pilots (8), 4 hrs. 55 mins.; passengers carried (7), 1 hr. 20 mins.

XF, our third machine, is now in commission and busy. The event of the week was the halt here for the King's Cup Race. In spite of rough weather we had a good assembly of spectators, who constantly had to shelter in their cars, heavy showers intermittently falling all the afternoon. The first arrival was anxiously awaited, and then excitement was well maintained, almost too well perhaps for those controlling the aerodrome, sometimes three and four machines landing almost at once. Everything, however, appeared to pass off smoothly, thanks very largely to the organising ability of Mr. C. G. Holmes, who was responsibile for all aerodrome arrangements, and the volunteer staff under him,, and we hope that competitors were satisfied with the arrangements made for them. The management of the aerodrome was made much easier owing to the ready and able assistance rendered by the R.A.F., who have lately arrived here, to whom our very grateful thanks. Over 200 teas were served in the hangar and Club House, almost entirely run by voluntary work of Club members. The control work of the A.A was as usual admirable, and the Rev. Gav and his boy scouts gave splendid assistance selling programmes and tea tickets. After the departure of the last competitor we threw a typical Bristol "party" in the Club House—this continued until the early hours elsewhere, and with some only died an unnatural death about lunch time on Saturday.

CINQUE PORTS FLYING CLUB, LTD.

(JUNE 23-29).—Pilot instructor: K. K. Brown. Ground engineer: R. H. Wynne. Machine in commission: G-EBRI de H. Moth. Total for week: 12 hrs. 50 mins. Dual: Mr. Mann 30 mins., Mr. Preston 45 mins., Lt.-Cdr. Gubbins, R.N., 30 mins, Mr. Cooke 2 hrs., Mr. Llewellyn 1 hr. 30 mins., Mr. Iles 30 mins. Total, 6 members, 5 hrs. 45 mins. Advanced dual: Mr. West 1 hr., Mr. Fitzgerald 30 mins. Total, 2 members, 1 hr. 30 mins. Joyride: One 10 mins. Special journey: Lympne-Rotterdam and return, 4 hrs. 40 mins. Tests: 4 hrs. 45 mins.

The low time this week was accounted for the fact that high winds stopped club flying on the Sunday and R. I. was away at Rotterdam for two days.

(JUNE 30-JULY 6).—Total for week: 12 hrs. 45 mins. Dual: Mr. Wynne 30 mins, Mr. Dorman 1 hr., Mr. Cooke 30 mins., Mr. Llewellyn 1 hr., Lt.-Cmdr. Gubbins 1 hr. 15 mins., Mr. Cox 30 mins. Total, 6 members, 4 hrs. 45 mins. Advanced dual: Mr. West 1 hr. 15 mins., Mr. R. Dallas Brett 45 mins. Total, 2 members, 2 hrs. Soloist: Mr. Fitzgerald, 30 mins. "A" pilots: Mr. Ellis, 4 hrs. Joyrides: three, 50 mins. Tests: five, 40 mins.

High winds stopped flying again all day on Sunday, 30th, and there was no club flying on Friday, 5th, owing to the King's Cup Race.

Mr. H. R. Law, in Moth G-EBYJ the Club's representative in the King's Cup arrived late at Lympne, owing to having gone to Hunstanton by mistake, and having to return to Norwich. However, he proceeded in spite of the weather and an impossible handicap, and only retired at Blackpool on account of serious magneto trouble. We wish him better luck next year.

The handling of the Lympne control for the race was rendered exceedingly difficult by the very high wind, which necessitated the machines being held down or chocked all the time they were on the ground. It was solely due to the very hard work of the officers, N.C.O.'s and airmen of No. 25 (Fighter) Squadron, R.A.F. Hawkinge, who so sportingly volunteered to help the club officials, that only one accident occurred, when Mr. Ashworth's Avian was blown over just after landing and broke its propeller, necessitating retirement from the race. We offer our apologies to any competitor who suffered inconvenience or delay at our control, but we feel sure that all competitors appreciated the very great difficulties under which control was worked, and we do not actually know of anyone who suffered delay.

We would like also particularly to thank Squadron-Leader Payn and his officers, N.C.O.'s and airmen for the most sporting way in which they came to our assistance and for the very hard work which they performed so efficiently.

Mr. Dorman, of Ashford, and our ground engineer, Mr. R. H. Wynne, began flying instruction during this week.

HAMPSHIRE AEROPLANE CLUB

(JUNE 29–JULY 5).—Pilot instructor: Flight-Lieut. F. A. Swoffer, M.B.E., and Mr. W. H. Dudley. Ground engineers: Messrs. E. Lenny, S. Riches and J. Elliott. Aircraft: D.H.60 Moth, G-EBOH. Flying time for the week, 6 hrs. 20 mins. Pupils under instruction (9), 3 hrs. 50 mins. Soloists, (2), 55 mins. "A" pilots (3), 1 hr. 30 mins. Instructors' tests, (1), 5 mins.

We have been kept fully occupied this week with preparations for the King's Cup Race. A small but enthusiastic crowd turned up and displayed great interest in the arrivals.

Mr. Staniland on a Cirrus Spartan was the first to arrive and he was closely followed by Lieut. Richardson on a Moth and Capt. Stack on the Hermes Avian. About 30 other aircraft came in within 1¾ hrs. of the first competitor.

Our sympathy went out to Flight-Lieut. Ashton, who found the very strong headwind rather too much for his little H.A.C. monoplane, and was forced to give up at Hamble. It was unfortunate also that Mr. Napier was unable to continue to Filton on his Widgeon owing to illness.

We are pleased to inform the pilot who inadvertently taxied over a mechanic that the latter came to no harm.

Shortly after the last competitor had left for Filton we observed a light machine coming in from the north. The pilot executed a couple of joyous loops over the aerodrome and landed. It turned out to be Mr. Dudley who had brought our missing Avian back from Manchester where it had been undergoing overhaul and repairs.

Flying time for the month ended June 30, 1929. Total time for the month, 130 hrs. 55 mins.—Dual, 60 hrs. 30 mins.; solo, 28 hrs. 55 mins.; "A" pilots, 28 hrs. 55 mins.; instructors, solo and passengers, 12 hrs. 35 mins.

LIVERPOOL & DISTRICT AERO CLUB

(JUNE 30–JULY 6).—Machines in commission, Avro Avians XX, XY, ZM. Instructor: Flight-Lieut. J. B. Allen. Ground engineers: Messrs. H. Pixton and M. Mason. Total flying time, 50 hrs. 20 mins. Pupils (dual) (24), 26 hrs. 30 mins.; (solo) (7), 6 hrs.; "A" pilots (12), 8 hrs. 45 mins.; passenger flights (13), 8 hrs. 15 mins.; test flights (10), 50 mins.

Mr. Crosthwaite, with Mr. Salter, represented the Club at the Blackpool Meeting held by the Lancashire Aero Club in connection with the King's Cup control.

Flight-Lieut. Allen and Mr. Moulsdale gave a display of aerobatics on Saturday afternoon in connection with a Charity Fête at Rock Ferry.

MIDLAND AERO CLUB

(JUNE 30–JULY 6)—The total flying time was 42 hrs. 26 mins. Dual, 15 hrs. 6 mins.; solo, 18 hrs. 27 mins; passenger, 8 hrs. 5 mins.; test, 46 mins. The following members were given dual instruction by Messrs. W. H. Sutcliffe and T. W. J. Nash, A.F.M.:—E. C. Merrick, K. S. Neale, H. G. Tower, B. P. A. Vallance, R. Darlington, F. G. Robinson, L. W. Farrer. F. T. Lydall, R. O. Wilcoxon, C. Blakeway, T. G. Ellison, J. R. Bond, L. V. Mann, G. Norton, H. Coleman, H. A. Taylor, A. P. Hunt, H. Beamish. Advanced dual: H. J. Willis, A. B. Gibbons, R. C. Baxter, R. L. Brinton.

"A" pilots: R. L. Jackson, J. Rowley, R. C. Baxter, J. Cobb, E. P. Lane, R. L. Brinton, H. J. Willis, J. K. Morton, E. D. Wynn, C.W. Fellowes, F. J. Steward, S. H. Smith, A. H. Gibbons, G. Robson, W. M. Morris.

Soloists: F. G. Robinson, P. B. Hackett, F. T. Lydall, R. O. Wilcoxon, T. G. Ellison, H. G. Tower, J. R. Bond, L. V. Mann, K. S. Neale, H. Coleman, H. E. Evans, A. P. Hunt. Passenger flights were given to 27 members.

Messrs. F. T. Lydall, J. R. Bond, and H. G. Tower successfully made their first solos.

Mr. T. W. J. Nash, A.F.M., has been appointed Assistant Instructor, and took up his duties on Thursday.

NEWCASTLE-UPON-TYNE AERO CLUB

(JULY 1-7).—Instructor: G. M. S. Kemp. Engineer: W. Dunning. Assistant engineer: J. Tait. Aircraft: (3) PT, QV, LX. Flying time, 33 hrs. 40 mins.—Instruction, 19 hrs. 20 mins.; "A" pilots, 3 hrs. 5 mins.; solo training, 5 hrs. 50 mins.; passengers, 4 hrs. 35 mins.; tests, 50 mins.

Messrs. Anderson, Davies and Miss Trevelyan all completed successful first solo flights. Our solo flyers who are unlicensed are very eager, more eager than our licensed pilots, according to the time shown above, in fact the number of soloists waiting their turn for the machine at times is quite numerous. Great was the sorrow when it was learned that Pilot Officer H. Leech, a member of our club, had been forced out of the Air Race on Friday, having only been 2 mins. behind the leading machine at Blackpool. Mr. Irving another of our pilot members, was the only one of our entrants left, and naturally all interest was concentrated upon him. He did remarkably well, having increased his position by six places from Renfrew on the last day.

SUFFOLK & EASTERN COUNTIES AEROPLANE CLUB

(JUNE 30–JULY 6.)—Instructors: G. E. Lowdell, A.F.M., H. M. T. Clayton Ground engineers: E. Mayhew, H. Brown. Aircraft: Bluebirds—RE, SZ, UH and ABF. Flying time: 23 hrs., by Suffolk and Cambridge Cubs, as follows:—

Suffolk Aero Club.—Total flying time: 17 hrs. 10 mins. 13 members were given dual: 7 hrs. 50 mins. Five members flew solo under instruction: 3 hrs. 35 mins. Flights were made by 5 "A" and "B" pilots: 2 hrs. 5 mins. 13 passengers were carried: 2 hrs. 35 mins. 11 tests were made: 1 hr. 5 mins.

Mr. May, after two weeks' instruction from the *ab initio* stage, performed his first solo successfully.

The competitors in the King's Cup passed through on Friday in a half gale.

Cambridge Aero Club.—Total flying time: 5 hrs. 50 mins. Five members were given dual: 1 hr. 55 mins. Flights were made by 1 "A" pilot: 35 mins. Eleven tests were made: 1 hr. 30 mins. Three passengers were carried: 1 hr. 50 mins.

FROM THE FLYING SCHOOLS

Brough Flying School, North Sea Aerial and General Transport, Ltd.

(JUNE 30–JULY 6.)—The total flying time for this week amounts to 54 hrs. 50 mins., of which 40 hrs. were carried out on "Darts" and "Bluebirds" and the remaining 14 hrs. 50 mins. on seaplanes.

On "Bluebirds," Pilot Officers Higgins, S. Clarke, W. Clarke, Buck, Wood and Hay received 13 hrs. 40 mins. dual from Messrs. A. G. Loton and J. B. Stockbridge, and carried out 3 hrs. 30 mins. solo flying. Flying Officers Dick, Rhodes and Brewster received 5 hrs. 25 mins. dual on "Darts," and carried out 8 hrs. 25 mins. solo flying.

On the seaplane school, Flight-Lieut. Marlowe and Flying Officers Martin and Mayer received 25 mins. dual from Flight-Lieut. N. H. Woodhead and carried out 14 hrs. 25 mins. solo flying; Flight-Lieut. Marlowe completing three quarters' training on Friday.

On Sunday the school was visited by Sir Alan Cobham who took a large number of local residents up for passenger flights in his D.H. giant Moth *Youth of Britain.*

Phillips and Powis School of Flying, Reading Aerodrome

(JUNE 28–JULY 4).—Flying time, 24 hrs. 15 mins. Instructors: Flying Officer R. T. Shepherd and Mr. H. B. G. Michelmore.

As official Moth agents, shall be pleased to demonstrate the new Gipsy Moth now installed on the aerodrome to anybody interested.

Our secondhand department seems popular. Three machines having been sold this month. The last sold is a Mark I Moth to Mr. A. L. Hill.

OVERSEAS CLUBS

SINGAPORE FLYING CLUB

(MAY 26–JUNE 1).—Total flying time, 12 hrs. 20 mins.—Dual instruction, 3 hrs. 40 mins.; solo flights, 3 hrs. 25 mins.; passenger flights, 5 hrs. 15 mins.

On May 29, Mr. W. I. L. Legg, with Mr. W. L. Morgan as passenger, went up at midday to endeavour to locate the whereabouts of a lighter which had broken adrift, and which might constitute a possible danger to shipping. As the machine had not returned by 4 p.m. some anxiety was felt, and Mr. H. W. Shook set out in G-EBUJ, with our ground engineer as passenger, to endeavour to locate the missing G-AADK. He was not successful, however, and returned just before dark.

It eventually transpired that G-AADK had been forced to land at the Karimoen Islands on account of engine trouble, so spares were sent by launch and the machine was flown back on the following morning.

Pilots Please Note!

IN view of the large number of Service aircraft which will be employed at Hendon aerodrome from now until Sunday, July 14, in connection with the Royal Air Force Display, civil aircraft are warned against landing at that aerodrome until after that date. Pilots of civil aircraft are further warned to keep a sharp look-out for Service aircraft taking part in races over a course lying approximately within the following area:—Harrow Weald—Elstree—Chipping Barnet—Hornsey—Wealdstone. Stag Lane aerodrome is suitable for the landing of civil aircraft conveying persons by air to the Display, the road distance from Hendon aerodrome being 1¼ miles.

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KING'S KUP KOMICALITIES FROM KRAMLINGTON

THE MOST MEMORABLE THINGS AT CRAMLINGTON···SAT: 6-7-29
THE WEATHER.
A 'FIGHTER' TIED DOWN.
AND THE ARRIVAL OF CAPT. STACK,—
-AT WHICH THE 'FIGHTER' FELT THE CALL OF THE AIR, AND STRAINED HARD AT IT'S LEASH.
ENTER MISS SPOONER!- CRAMLINGTON STRAIGHTENS ITS TIE
THEN A MEDLEY OF 'MOTHS', 'AVIANS' AND 'WIDGEONS', AS WELL AS A 'GREBE'.··· WHICH MADE THE 'FIGHTER' KICK HARDER THAN EVER.
ENTER A HURRICANE, WHICH BANKS STEEPLY, LANDS, AND BECOMES THE 'VICKERS' 'HUSH-HUSH'
EVEN THE 'FIGHTER' SAGGED IN AWE.
CRAMLINGTON HELPING A·F·WALLACE INTO HIS SUIT, (ALL OF IT).
LIGHTNING!- IN THE FORM OF H·S·BROAD ON A 'MOTH'—
TRAGEDY! A·F·WALLACE CASTS AWAY HALF-SMOKED CIGARETTE.
MASS ATTACK ON THE MASTER OF SEMPILL'S 'BLUEBIRD' BY SAVAGE MECHANICS.
A LITTLE MORE 'WEATHER' AND WE COULD HAVE HAD A 'SOUTHAMPTON' AT 'SCRATCH'
-AND A CONVULSIVE SHUDDER FROM THE 'FIGHTER'
NEWCASTLE CLUB 'MOTH' FORMING FOURS, WITH THE AID OF MR·KEMP.
BYE
TOM

AIR SURVEYING AND ITS DEVELOPMENT

Aircraft Operating Co.'s Pioneering Work

IN the House of Commons, on July 3, Mr. J. H. Thomas, Lord Privy Seal, when speaking upon Colonial development, and in connection with cotton, was most emphatic in regard to a progressive policy in the Colonies, and in one particular emphasised his appreciation of the wonders of surveying from the air. "I now find," he said, "that surveying in the ordinary course will take four or five years. Is it worth waiting five years for surveys? I also find that with modern aeroplanes which are now at our disposal, these surveys can be done in four months. We shall have them carried out by aeroplane straight away, wherever necessary, to save delay in valuable developments. All this is an indication of how much can be done with the Empire."

This gesture in the interests of the British Empire from the Socialist Government is, to us of the Air, very satisfactory. Naturally, it secured from Major H. Hemming, Managing Director of The Aircraft Operating Co., Ltd., a letter to the Press in which he corroborated all that was so favourably viewed by Mr. Thomas. Major Hemming said it was becoming generally recognised that, before opening up undeveloped territories, an economic survey should be made. Merely by way of instance, Major Hemming pointed out that it would be possible to carry out an economic survey of Northern Rhodesia, which has an area of approximately 300,000 square miles, for less than £450,000—that is at a rate slightly below 30s. a square mile. This figure covers all costs, including the flying and taking of the photographs, the laying down of the ground control, the preparation not only of the topographical maps, but also of the geological and vegetational maps, and the sending out of the experts dealing with vegetation, soils, minerals, etc., and the information gained would also enable the authorities to decide on the best lines for new roads or railways to take. This survey could be completed in four years.

In this connection the following particulars of the remarkable work already carried out by the Aircraft Operating Co., Ltd., at a fraction of the cost of other methods, are of intense interest.

In five years, the Company has grown from a unit consisting of three directors, a secretary and a typist, to an organisation employing 150 people, and if its subsidiary company, Aerofilms, Ltd., is taken into consideration, the total number of employees is 170.

At present the company has expeditions working in the Rhodesias, and in Brazil, and a third expedition has recently returned from Iraq. Details of some of the work undertaken by the company are as follows:—

For the Rhodesian Congo Border Concession, Ltd.:—An air survey and reconnaissance work in their concession area of 52,000 square miles. For the Anglo-Belgian Boundary Commission: Two hundred miles of boundary photographed, the resulting photographs covering an area of 500 square miles. For the Government of Northern Rhodesia: Town development surveys of Livingstone, Broken Hill, Lusaka and Mazabuka, the total area surveyed being approximately 900 square miles; mapping of an area of approximately 11,000 square miles along the northern boundary from oblique air photographs; a navigation survey of the Zambesi River and certain of its tributaries embracing an area of 900 square miles. For the Benguella Railway Company, a visual reconnaissance of the Lungwebungu River.

Southern Rhodesia: Photographing the railway running past the Wankie coal mine in order to obtain the necessary information to assist in straightening out the railway; archæological survey of Khami Ruins near Bulawayo.

For the Egyptian Government: an air survey of the Nile Valley at El Wasta, covering an area of approximately 200 square miles.

For the Iraq Government: An air survey of 1,050 square miles of undeveloped land adjacent to Baghdad, to enable the Government to arrange for the development of this land by irrigation.

The company are at present carrying out a survey of the City of Rio de Janeiro and the Federal District. The photography has been completed, and maps are now being made from the photographs on scales of 1/1,000, 1/2,000, 1/5,000 and 1/20,000. The company are also carrying out other contracts in Brazil.

The personnel of the company have been engaged in air survey work in the following countries:—Great Britain, Africa, Canada, India, Burma, British Guiana, Newfoundland and Labrador, the United States of America, Iraq, Egypt, Brazil and Venezuela.

New Survey Machine

This world-wide experience under widely varied climatic conditions has resulted in valuable experience being gained not only in the carrying out of air survey work and mapping, but also in the operation of aircraft. As the result of this experience, the company has produced special apparatus and

A low oblique photograph (left), and also a vertical photograph of the village of Khadimain, on the River Tigris, taken in conjunction with the air survey carried out by the Aircraft Operating Co. for the Iraq Government.

instruments for the speeding up of the work and for increasing the accuracy of its surveys. The most interesting example of this new equipment is the special air survey aeroplane. This machine has been built by the Gloster Aircraft Company, to the specification of The Aircraft Operating Company, and will be on view to the public on the former company's stand at the forthcoming International Aero Exhibition at Olympia.

The company has established photographic laboratories and drawing offices at Hendon, also an experimental section. In these drawing offices the maps of the area surveyed adjacent to Baghdad are being produced. They have also fully equipped laboratories and drawing offices at Bulawayo and Rio de Janeiro. This development has taken place as the result of private enterprise. Air survey is, in fact, the only branch of the operational side of civil aviation which has become commercially self-supporting, and provides a reasonable contribution towards the development of new countries. This fact is not appreciated by the general public, chiefly because all official speeches reported in the Press on the progress of civil aviation have been confined to the progress and development of Imperial air routes and the Light Aeroplane Clubs.

Today it can be authoritatively stated that in the practical field of air surveying, British interests lead the world. All this has been achieved without any form of Government subsidy or other Government financial assistance.

Value of Air Survey

In these days we hear a great deal about unemployment, and the necessity of developing trade within the Empire. Air survey can play a leading part in the solution of these problems. Up till now migration of settlers from England to the Dominions and Colonies has not been popular because of the very great gamble that the settlers have to take in finding suitable land to settle on and develop. It is now becoming recognised that by carrying out economic surveys of a country prior to development, it is possible to decide what portions are worth developing. Experts can decide on the suitability of the soil and geological structure for different types of agriculture.

AIR SURVEY OF IRAQ FOR THE IRAQ GOVERNMENT: A sheet from the Conventional Line Map and a photographic Map Sheet from which it was prepared. The district is the desert country near the River Tigris.

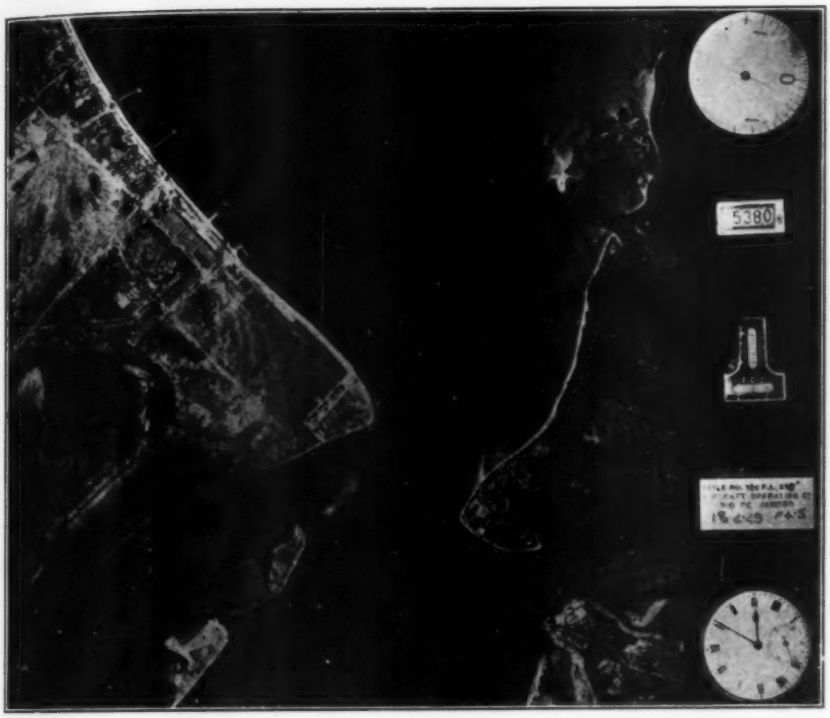
The result is that it is now possible to lay down railways and roads so that they may pass through that part of the country suitable for settlement. This will do much to encourage settlement. An economic survey by ground methods alone would be costly and take a very long time to carry out.

The Problem of Finance

Air survey provides an efficient and cheap means of carrying out economic surveys rapidly. The only problem standing in the way of air survey is finance. In order to achieve a really economic figure of cost in relation to speed and information gained, it is essential that large areas should be surveyed. It is beyond the resources of most of our Colonies to pay for such surveys, therefore the Aircraft Operating Co. thinks that an Imperial Loan Fund is required for providing a means of paying for this work.

Recommendations were made on these lines in the Report of Sir Hilton Young's Commission with regard to the development of Central and East Africa. The Commission emphasised the importance of making surveys of a country before trying to develop it. The present stage of efficiency which air surveying has reached provides a means of enabling the recommendations of the Hilton Young Commission to be put into effect rapidly and economically. To get the best results from an air survey, the fullest co-operation between the various departments of a Colonial Government is essential. In addition to providing the surveyor with valuable data for the mapping of the country, the aerial photographs also contain priceless data for the departments dealing with forestry, mining, roads and railways, land settlement, navigation and water power, etc.

The directors of the Aircraft Operating Co., Ltd., are Mr. A. S. Butler (Chairman), Major H. Hemming (Managing Director), Mr. T. P. Mills, Major R. H. Mayo, Col. H. L. Crosthwait and Major C. K. Cochran-Patrick. At least three of these directors are prominent pilots, namely, Mr. A. S. Butler, Major H. Hemming and Major C. K. Cochran-Patrick.



The Naval Aerodrome at Rio de Janeiro photographed from an altitude of 10,000 feet from an Aircraft Operating Co.'s survey machine. Another of their machines is in the harbour, from which the Company are now carrying out a survey of the city and district.

Those of our readers who may not have studied aerial photography and the aerial camera will be very curious to know the meanings of the records shown on the side of the above photograph of Rio de Janeiro. Most of these records are made automatically, as the photograph is taken, and appear on each one. The bottom dial records the time, the next already gives the name of the survey company and the place of the survey, with a space in which the photographer writes in the date. Then, above that, is a lever recording the stability of the survey aircraft. The number of the camera plate is the next reading and, on top, the altitude of the aircraft. To conclude, one might mention that the cameras used by the Aircraft Operating Co. are the Williamson "Eagles."

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Prime Minister's Flight

MR. RAMSAY MACDONALD, the Prime Minister, again chose flying to keep a distant engagement on July 6. He flew from Halton, Bucks, to Durham in an R.A.F. Fairey IIIF machine, and on the conclusion of his address at a miners' fête he returned by air.

European Tour by Soviet Aircraft

ON July 10, a flight round Europe was due to start from Moscow in a three-engine machine of Russian construction. The places which may be visited are Berlin, Vienna, Rome and Warsaw. This flight is possibly the first of its kind planned by the Soviet.

New American Record Attempt

A Buhl air sedan was continuously flying during the past week in an attempt to beat the recent duration record with refuelling set up in a Stinson Detroiter by Mr. Mitchell and Mr. Newcomb on July 6, which is mentioned elsewhere in this issue. The crew of the Buhl machine were Mr. Loren Mendell and Mr. Pete Reinhardt.

Air Garden Party

IN connection with the International Aero Exhibition the Royal Aero Club will give an Air Garden Party at Heston Air Park, Hounslow, on Saturday, July 20. The programme will consist of an Air Rally, International Aerobatic Competition open to all types of aircraft, and an Aerobatic Competition confined to pilot instructors of recognised light aeroplane clubs flying light aeroplanes. Substantial prizes will be offered in connection with these competitions, and full particulars can be obtained from the Royal Aero Club.

Northern Air Lines, Ltd.

AN air race between two teams of pilots representing Liverpool and Manchester, has been arranged for Saturday, August 10. The start and finish will be at Wythenshawe Aerodrome. The course will be to Hooton, and machines will remain at Hooton for thirty minutes before returning. Pleasure flying and stunt flying will also take place during the afternoon and evening by Northern Air Lines.

British Steel Strip and Bar

WE have received from United Strip and Bar Mills, Ltd., Sheffield, an interesting booklet dealing with the various sections of steel strip and bar that they have available with useful tables incorporated.

From the illustrations and description of their plant, it would appear that it is a very advanced plant for the continuous production of strip and bar steel. It is of particular interest to learn that United Strip and Bar Mills, Ltd. (which is a branch of The United Steel Companies, Ltd.) caters specially for reinforced concrete work. They have a service department where reinforcement bar is supplied in lengths ready bent, hooked, marked and bundled, and delivered to suit the contract. A special department under a ferro-concrete engineer will also get out quantities and advise generally on ferro-concrete construction for the needs of the smaller contractor. Steel users in the South are catered for by the large stocks for immediate delivery held at the London warehouse. We understand that those interested may obtain a copy of this useful booklet on application to the Publicity Department, United Strip and Bar Mills, Ltd., The Ickles, Sheffield.

Model Aeroplane Competition

The Halton Model Aircraft Society, of which Captain E. G. M. Neville is Hon. Secretary, is holding an International Model Aeroplane Competition for the Sir Charles Wakefield Cup on July 14 at 6 p.m. There will be other events with model aircraft, and free aeroplane rides will be awarded by a lucky number programme competition. Admission is sixpence and children pay half-price.

THE "ROBUR" PARACHUTE

New Type With Automatic and Manual Release

WE have received some details from the manufacturers of a parachute which is new to this country. We have not personally witnessed it in action yet, but we hope to do so in the future. For the present, then, we analyse and summarise the inventor's description and claims. The "Robur" parachute, as it is called, has been produced by the manufacturers of the "Thörnblad" parachute, and incorporates the years of experience gained with the latter. The chief difference between them is that the "Robur" is fitted with both static and manual releases, whereas the "Thörnblad" only acts automatically.

Further, the "Robur" functions with a pilot parachute, and the "Thörnblad" without it. We understand that the advantages of the "Robur" include a closed chamber for the static line, an elastic apex and apertures in the canopy, and an absence of bands or external parts on the container. The inventor declares that placing the static line in a chamber prevents premature opening of the pack, and that official German tests from machines whilst spinning have shown that there is no risk of entanglement of the static line with the machine or the airman.

The elastic apertures in the canopy fill a fourfold duty. First it is claimed that the opening shock is greatly reduced. This is important in view of the increasing speeds attained in aircraft, which mean that the airman also must be protected from shock. These apertures also expedite the opening of the canopy, as air enters the interior as the parachute is opening.

They further contribute, it is said, to stabilising the descent and decreasing the rate of descent. Parachute silk or cotton of high quality is used for the canopy, while shroud lines are of silk of high tensile strength. A great number of divisions make up the canopy, which is said to distribute the shock evenly and increase the resistance of the parachute; whilst the numerous seams, placed diagonally to the shroud lines, prevent a lengthy split arising.

All these conditions in the "Robur" are derived from the latest type of the "Thörnblad." Classed as special features in the "Robur" are the following:—(1) The static release device functions independently of the manual release. (2) Both release devices are well protected along the sides of the container. (3) The opening of the container is effected by a number of rustless springs, which retain their qualities, or rubber elastic bands. (4) Pilot parachute is packed separately from the main parachute. (5) The manual release device is easily disconnected from the container and harness.

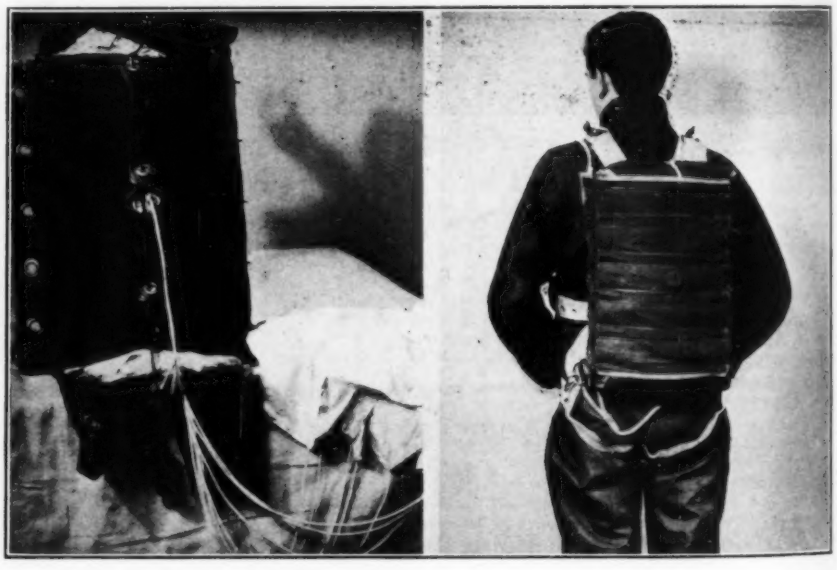
The "Robur" parachute in action is described as follows When the airman has climbed into his cockpit the free end of the static line is attached to a suitable spot in the cabin. When he jumps the pocket holding the static line is first broken by the line. Then the line is drawn out of the container, and when fully stretched it in turn draws a wire along one side of the container. This opens a cover fitted with rustless springs, then the cover coils up, rolls to the other side, and releases a pilot chute, which immediately fills with air and as its shroud lines stretch it draws pins holding the main parachute covering. This covering then opens, the pilot chute draws out the main parachute and air penetrates the interior, first through apertures at the side and then through the base. That completes the opening of the main parachute.

Through the pilot parachute being packed separately from the main parachute, the risk of both being caught by the airscrew stream simultaneously and causing an overturning of the main parachute is avoided, states the inventor.

The inventor also prefers to pack the pilot parachute separately from the main parachute, because he thinks that if they are packed together, they open together, and the pilot parachute does not then pull the main one out. By separate packing he thinks that the pilot must always fill with air before the other is released, and consequently can always stretch the main parachute. If the manual operation is necessary, the pulling action on the static line is done by the airman. Thus the airman has another safeguard should the automatic method not be in use. In conclusion, we are informed that the "Robur" is made as strong and reliable as possible, with particular regard for new developments in aircraft, such as extreme speeds.

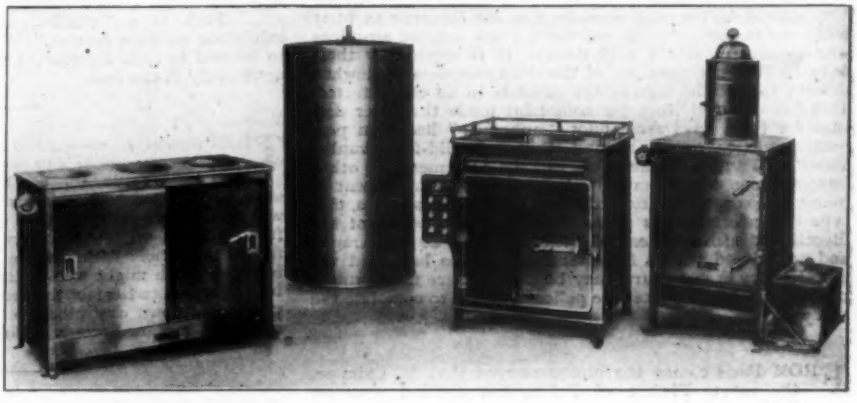
The manufacturers emphasise that the automatic static release should be used whenever possible, and the manual release only in case of need, that is, when the static line for one reason or other, has not been fastened to the aeroplane. With this one exception the "Robur" can always be used automatically at high and low speeds, and high and low altitudes, including when a machine is spinning.

The automatic type is mostly suitable for a pilot as the static line can always be fixed in position, thus he can jump at any moment without any action on his part. The combined type, that is with automatic and manual release devices, is suitable for observers who have to move about in a machine and cannot always have the static line attached. Tests of the "Robur" have been made in many countries.



The "Robur" parachute, a type new to this country. It embodies experience obtained on the "Thornblad" parachute. It combines automatic and manual operation, and its characteristics include the separation in packing of the pilot chute from the main chute.

ELECTRIC COOKING EQUIPMENT FOR R.101



The Electrical Cooking Equipment for R. 101, comprising (left to right) hot cupboard, hot-water tank, oven, vegetable steamer and tea urn.

WHEN the new British rigid airships commence their long journeys to distant parts, the passengers will, of course, have to be fed, and the provision of suitable meals — other than "tinned" fare—means cooking on board, as on ocean-going liners. The Automatic Telephone Manufacturing Co., Ltd., Strowger Works, Liverpool, makers of the well-known Xcel electric domestic appliances, have just completed the manufacture of a special light-weight electric cooking and water-heating installation for the new British Government airship R101, now under construction at Cardington, and the following brief particulars may be of interest.

The problem set by the Air Ministry, by whom the equipment was ordered, was no light one. Cooking accommodation for 100 persons was specified, the complete installation being restricted as to maximum permissible weight and electric power available for this specific duty. Furthermore, due to the proximity of large volumes of inflammable hydrogen, all elements had to be rated for low-current density, ensuring "black" heat at full load and an absence of risk of ignition of any escaping gas. To this end also, all switch controls had to be of special design, in flame-proof enclosures, following the usual procedure for safeguarding electrical apparatus in collieries.

The equipment—into the construction of which duralumin, the light-weight alloy, largely enters—comprises five separate items. The cooking range has four boiling plates and an oven, 24 in. by 24 in. by 18 in. The two back boiling plates are each 8¼ in. diameter and of 1,500 watts loading, while the front plates are each 7 in. diameter and loaded to 1,000 watts. All are totally enclosed and constructed on the latest "Xcel" high-efficiency principle, whilst the hob-plate is surrounded by a guard rail to ensure the stability of utensils placed upon it.

The oven has two heating elements, each of 1,250 watts, and the entire range is wired for three-heat control through the medium of a totally enclosed control switchbox, the supply being, at 220 volts, 100 cycles alternating current. There are three sliding-rack shelves in the oven.

A vegetable steamer with a capacity 18 in. by 22 in. by 24 in. is equipped with elements giving a total loading of 1,500 watts, and is furnished with single heat control. It is fitted with removable wire tray baskets. A ball-valve tank is attached to the right-hand side of the steamer for maintaining a continuous supply of water to compensate for the evaporation loss.

A hot-cupboard measuring 3 ft. 6 in. by 1 ft. 10 in. by 2 ft. 8 in. is heated by elements totalling 2,000 watts, and is equipped for single-heat control. It has sliding doors, perforated metal shelves, and the top is recessed to function as a carving table and to facilitate the retention of plates, etc., placed upon it.

To ensure a supply of hot water for dish-washing, etc., a 40-gallon cylindrical hot-water storage tank is provided. It is equipped with three immersion heaters, one of 1,000 watts and two of 750 watts loading, making a total of 2·5 kw.

Smaller demands for tea, etc., are met by a 3-gall. Xcel urn, equipped with two 750-watt units, protected against burn-out in the absence of water by a thermal cut-out connected in series with their common junction.

Having regard to the importance of weight limitations, it is interesting to record that the total weight of the completed equipment worked out within 10 lbs. of the limit set by the Air Ministry. The whole of the above equipment was designed and manufactured by the Automatic Telephone Manufacturing Co., Ltd., at their Victor Works, Liverpool, to the requirements of the Air Ministry.

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London Chamber of Commerce and Aviation

A CIVIL Aviation Section of the London Chamber of Commerce was formed on July 3 at a meeting which was representative of all aviation interests. Lord Herbert Scott, who is President of the Chamber, presided at the outset, and amongst the interested personalities present were Lady Bailey, Sir Samuel Instone, Col. The Master of Sempill, Mr. A. S. Butler and Sir Harry Brittain. During the proceedings Sir Harry Brittain was elected Chairman of the Section for the first year, and Mr. A. S. Butler and Col. The Master of Sempill, Vice-Chairman, whilst Sir Charles Wakefield was one of a large number who were appointed members of the Standing Committee. We shall give further details in the near future of this progressive formation which should do so much in the interests of aviation.

Hull Municipal Airport

HULL'S Municipal Aerodrome, a 200-acre site, four miles from the centre of the city, will be officially opened by H.R.H. Prince George on October 10. The aerodrome has been leased to National Flying Services, Ltd., who will be ready to operate by the opening date. Two miles further east on the river front Hull has acquired a seaplane base, with accommodation for land and sea machines.

An air pageant is to be staged for the official opening in October, and the main item on the programme will be a display by a squadron of R.A.F. fighters. Many airmen have been invited and several of the aircraft firms have promised to send demonstration machines. The co-operation of the various flying clubs is being sought, and there will be a light aeroplane race for which three trophies and a special cup for club entries are to be offered. There is also to be a landing-on-time competition as part of the Civil rally and two cups will be put up. The prizes will be presented by Prince George during the afternoon. The full band of the R.A.F. has been engaged, and Hull hopes to start off its career as an air port in convincing style. Messrs. Blackburns, whose works are at Brough, just outside Hull, are rendering excellent help and are providing accommodation for visiting machines. The Air Minister has accepted the City's invitation to be present. Further information about the pageant, etc., will be given by the Hon. Secretary, Mr. M. Goulden, *Evening News*, Hull.

Municipal Aerodromes

THE Bristol City Council have decided to proceed with a scheme for their municipal aerodrome at Whitchurch, close to the city. It is estimated to cost £13,200. The Carlisle City Council have also decided to purchase 260 acres of land close to the city for use as an aerodrome.

EDDIES

POWERFUL binoculars will probably have to form part of the equipment presently of our police force, having regard to the suggestion by the Air Ministry as to it being up to the police to enforce the law against air-pilots who indulge in stunts over towns. It is apparently their duty to take the numbers of the delinquents—a somewhat ticklish task if the human eye alone is to be the detector. This has emerged from the complaint made the other day that for three days some pilot "unknown" has been perpetrating loops, rolls, spins and other such wild-fowl pranks, above St. Paul's and the heads of City Aldermen and other important personages, much to the wonder and enjoyment of many thousands of citizens of less degree. Nevertheless, this type of performance is a vanity which—irrespective of the illegality of such senseless exhibitions—*should* be discouraged and suppressed with a firm hand, so it is to be hoped the Air Ministry in due course may be able to trace the infringer of the regulations and set the police in action to complete the story.

FROM Paris comes the announcement that M. Chiappe, the astute Prefect of Police, has decided upon an "Air Police Force"—which sounds as if France is again leading in up-to-dateness in its methods. But, as Mr. Schwenk Gilbert used to have it, "all things are not what they seem," and so it is in this case. The title "Air Police" is annexed as applying to the use of wireless for the detection of secret wireless messages which, it appears, are being persistently broadcast on short wave-lengths. The selection of this title appears, however, to be a little unfortunate in this year of Grace 1929, when aviation is very much coming into its own. Can it be so perfect a Prefect has not yet concerned himself to realise the extent of the penetration of aviation into the life of this world?

THAT proposed elaborate U.S. modern anti-aircraft defence scheme, described recently in the *New York Herald*, under which it is proposed to include the construction of a chain of 100 firing stations on the Atlantic and Pacific coasts for stationary and mobile heavy artillery, all connected by rail, so that the heavy guns may be quickly concentrated at any threatened point, smacks somewhat of the ancient Martello Tower stunt, perpetrated in the long ago, in Britain, of which the miserable-looking erections still stand as mementos of the folly of the thing. No doubt aerial attack is upon a different footing to approach from the sea in days gone by, but it does seem a little quaint for such precautions for America. It sets one wondering from which direction the possible attacker from the air might eventuate, or is it that optimism as to the strides world-wide aviation is likely to make in the near future does not preclude considering aggression from no matter how distant a clime? I wonder.

INCIDENTALLY, it may be noted that as a side issue of the defence scheme, rumour from New York has it that a new 3-inch gun for defence is on the way, capable of bringing down bombers at unprecedented altitudes, it being claimed that "a combination of four machine-guns on a single mount will spray a hostile machine with bullets as a hose sprays a garden. The new guns, it is said, will be equipped with an automatic range-finder, which will continuously compute the range, speed, and course of an aeroplane that the gunner cannot fail to keep exactly on his target at all times, while his machine fires 5,000 shots per minute. The army plans to protect every large city and every aviation field in the country with the new weapons."

Poor old League of Nations!

IN the meantime, at home, down Brighton way, "The League of Nations Union"—whatever that is—upon the proposal of Viscount Cecil of Chetwood, after he had drawn attention to the recently-declared policy of the U.S. for the prevention of war, a resolution was moved that the Government would "seriously consider whether it would not be possible to internationalise the whole or part of the national air force as an instrument for the defence of international order."

Quite a counsel of perfection, but——

MANCHESTER City Council have determined to use the one-time hundred-acre aerodrome at Alexandra Park as a "public park, open space, recreation, exhibition or show ground." At £450 an acre, the price said to be paid to Lord Egerton, it sounds as if someone has not done badly in the deal.

THAT aircraftsman—said to be by name Stanley Baldwin—who, the other day went for a few hours' joy-ride on his own in the big bomber from Worthy Down, must be some lad. What the members of the Court Martial will think of his exploit will be interesting and may postpone for a goodish while the consummation of his ambition to fly the Atlantic. Although he is not our ex-premier, this intrepid youth might well in time become the premier flyer, having regard to the fact that he is credited with never having previously flown any machine. What a testimonial to the modern aeroplane becoming fool-proof!

LADY BAILEY again, on July 8, received deserved honour at the hands of the Prince of Wales, when speaking at the Mansion House banquet on behalf of the Royal Institute of International Affairs, to welcome Sir Abe and Lady Bailey on their return from South Africa. The Prince in proposing the toast in their honour said "Before I submit this toast I have to say a word about Lady Bailey, who has up till now managed to avoid with typical feminine skill any celebration of her remarkable feat. She has been so quiet about it that it is hard, perhaps, to realise the scale and the pluck of her achievement. I, like many of you, have flown, or rather been flown, on various occasions, and we are always rather anxious before we go up to see that there is some fairly reliable outfit of maps in the machine; but Lady Bailey did not seem to worry very much about maps, and at one part of her journey her maps could have been contained in what a man calls his waistcoat pocket. They consisted of nothing more than the coastal outline furnished by the Union-Castle Company for the use of its passengers. But I must point out that Lady Bailey's achievement could never have been possible without a combination of high technical skill and great courage and endurance. Her performance will live long in the history of aviation and as I once had the opportunity some months back of saying—I am very glad to say it again—Lady Bailey is a very gallant lady indeed. We all wish Sir Abe and Lady Bailey a long and happy life." To which we on FLIGHT most cordially say "Hear, Hear."

SIR ABE later added his meed of praise to his wife's great achievements. "Take this flight of my wife's," he said; "it's a wonderful thing. No other human being in the whole history of the world has done anything so wonderful. Airwomen are contesting and questioning man's efficiency and supremacy, and no doubt we shall soon be told a man's place is his home, and that the hand-rocked cradle rules the world and must be rocked by him. The coming event, as far as I am concerned, has already cast its shadow, and I suppose I shall glide into the next world as the dirigible husband."

IN the United States, sportsmen and others, in expressing their objections to overhead flying and its effect upon their pet pastimes and enjoyments, were bound to "improve" upon British methods of erecting a flag-pole to prevent aeroplanes swooping down over houses, etc., as exemplified here recently down Hamble way. On Long Island, according to a New York correspondent, the Westbury Golf Club has decided to erect a steel fence 125 ft. high and 2,000 ft. long between Roosevelt Field aerodrome and the golf course, it being complained that continual forced landings endangered the lives of the players, damaged the fairways, and had generally a bad effect upon the play. Evidently the forced landing hobby in America is more prevalent than *this* side of the herring-pond. For which let us be thankful.

AEOLUS

THE ROYAL AIR FORCE

London Gazette, July 2, 1929

General Duties Branch

The follg. Pilot Officers are promoted to rank of Flying Officer :—O. G. Williams ; Jan. 18. D. Menzies, J. D. Richardson, H. G. Hamilton ; June 9. H. H. Leech, J. E. Allen, E. J. Hill ; June 17. M. Lowe ; June 30. The follg. Pilot Officers on probation are confirmed in rank :—R. A. Chignell, C. Stephenson ; Dec. 13, 1928. H. Bailey, V. S. Bowling, N. W. Creasy, E. D. Elliott, J. H. T. Simpson, W. R. Tope, L. E. A. Wright ; Dec. 30, 1928. A. F. Britton ; Jan. 21. J. B. Fyfe ; April 30. G. C. Butler, C. W. F. Carter, D. B. McGill ; May 9. F. A. R. Bishop ; May 17. R. L. Bennet, A. K. H. Binley, J. H. Brown, F. C. E. Hayter, J. M. Israel, G. W. J. Jarrett, I. M. Smith, W. G. Stevenson ; June 29.

Group-Capt. P. F. M. Fellowes, D.S.O., Air Aide-de-Camp to the King, ceases to be seconded for duty as Director of Airship Development, Royal Airship Works, Cardington, with effect from July 1, 1929.

Flight-Lieut. J. M. J. C. J. I. Rock de Besombes is placed on half-pay list, Scale A ; June 8. The follg. Flying Officers are transferred to Reserve :—*Class A.*—C. Clarkson, I. W. C. Mackenzie, R. H. Holmes, W. L. McLaren, C. R. Cubitt, W. F. Parkinson ; June 30. B. W. Barton ; July 3. *Class C.*—A. L. Ottway ; June 30.

Stores Branch

The follg. Flying Officers are granted permanent commns. in this rank with effect from April 28, 1928, on completion of probationary service :—R. N. Hesketh, B. G. Pool.

Accountant Branch

Pilot Officer on probation T. C. Reep is confirmed in rank and promoted to rank of Flying Officer ; June 11.

Medical Branch

A. C. Lysaght is granted a short service commn. as Flying Officer for a period of three years on active list with effect from June 11, and with seny. of June 11, 1928.

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

The follg. are granted commns. in Class AA (ii) as Pilot Officers on probation :—A. C. Buck, C. P. S. Smith ; June 20.

Pilot Officer C. R. S. Smith is promoted to rank of Flying Officer ; June 13. The follg. Pilot Officers on probation of Special Reserve are confirmed in rank :—J. F. Bristow ; Sept. 8, 1928. R. C. Newton ; Dec. 31, 1928.

Flight-Lieut. A. J. G. Anderson is transferred from Class B to Class C ; July 1. Flying Officer J. M. S. Taylor is transferred from Class A to Class C ; June 8.

The follg. Flying Officers relinquish their commns. on completion of service :—E. K. Clifford ; June 27. G. C. Sclater, A. L. Harris ; June 28.

Flying Officer F. A. Pumphrey, D.C.M., relinquishes his commn. on account of ill-health and is permitted to retain his rank ; July 3.

AUXILIARY AIR FORCE

General Duties Branch

No. 600 City of London (Bombing) Squadron.—The follg. Pilot Officers to be Flying Officers :—E. J. Earnshaw ; July 25, 1928. P. G. Stewart ; Sept. 1, 1928.

No. 601 County of London (Bombing) Squadron.—The follg. to be Pilot Officer :—N. R. W. Seely ; April 9.

No. 602 City of Glasgow (Bombing) Squadron.—The follg. to be Pilot Officer :—D. L. Lloyd ; April 21.

No. 605 County of Warwick (Bombing) Squadron.—The follg. to be Pilot Officer :—J. M. Abell ; May 14.

PRINCESS MARY'S R.A.F. NURSING SERVICE.

Matron Miss Muriel B. Botwood is placed on retired list at her own request ; June 28.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

General Duties Branch

Flight Lieutenants : B. A. Malet, D.F.C., to Elec. & Wireless Sch., Flowerdown, 7.6.29. F. G. S. Mitchell, to No. 1 Flying Training Sch., Netheravon, 3.7.29.

Flying Officers : L. B. McGoverne, to No. 84 Sqdn., Iraq, 8.6.29. F. G. Fairhead, to No. 30 Sqdn., Iraq, 7.6.29. G. M. Buxton, to Home Aircraft Depot, Henlow, 25.5.29. S. H. Hardy, N. C. Pleasance, B. H. Ashton and H. V. Forbes, to Home Aircraft Depot, Henlow, 7.6.29. A. H. W. J. Cocks, to Elec. & Wireless Sch., Flowerdown, 1.6.29. I. J. Fitch, to Elec. & Wireless Sch., Flowerdown, 25.5.29. F. S. Hodder, to Home Aircraft Depot, Henlow, 7.6.29. D. I. Stewart, to School of Naval Co-operation, Lee-on-Solent, 25.6.29. The following Pilot Officers are all posted to R.A F. Depot, Uxbridge, Supernumerary for a short disciplinary course on appointment to a Short Service Commn. (on probation) with effect from 28.6.29 :—G. E. Agard-Butler, N. Alexander, F. C. Allen, C. A. Ball, G. Bearne, G. Calvert, N. J. Capper, D. I. Carlyle, I. A. Critchley, C. H. Glover, D. H. A. Golege-Steel, W. E. Grant, D. C. Harrison, W. J. Hodge, A. H. Houghton, G. M. Ievers, F. J. B. Keast, D. W. Lydall, L. I. S. McNicol, C. W. Marriott, T. G. Mellor, C. E. Morse, J. T. Mynors, B. Paddon, H. G. J. Purcell, N. Stratton, J. M. Waddell, G. N. Warrington, G. E. S. Williams, and S. N. Wiltshire.

Pilot Officers : D. Menzie, to No. 47 Sqdn., Middle East, 12.6.29. P. K. Robertson, to No. 14 Sqdn., Middle East, 13.6.29. C. V. Howes, to No. 45 Sqdn., Middle East, 12.6.29. C. E. W. N. C. Pelly, to No. 216 Sqdn., Middle East, 9.6.29. J. K. Flower and J. Wilson, to No. 216 Sqdn., Middle East, 12.6.29.

Stores Branch

Flight Lieutenants : S. D. Dennis, to Royal Air Force Depot, Uxbridge, 24.6.29. R. G. Gore, to Air Ministry (D. of E.), 24.6.29.

Flying Officers : C. S. Whellock, to Royal Air Force Depot, Uxbridge, 24.6.29. D. G. McDiarmid, to R.A.F. Depot, Uxbridge, 24.6.29.

Accountant Branch

Flying Officer G. H. White, to No. 501 Sqdn., Patchway, 17.6.29.

Medical Branch

Flying Officer M. Clancy, to School of Naval Co-operation, Lee-on-Solent, 15.5.29.

ROYAL AIR FORCE—AIRCRAFT APPRENTICES

600 Vancancies for Educated Boys

THE Air Ministry announces :—Six hundred aircraft apprentices, between the ages of 15 and 17, are required by the Royal Air Force for entry into the Schools of Technical Training at Halton, Bucks, and at Cranwell, near Sleaford, Lincs. They will be enlisted as the result of an Open Competition and of a Limited Competition which will be held in the near future by the Civil Service Commissioners and the Air Ministry respectively. Successful candidates will be required to complete a period of twelve years' regular Air Force service from the age of 18, in addition to the training period. At the age of 30 they may return to civil life or may be permitted to re-engage to complete time for pension.

Full information regarding the dates of the respective examinations, the methods of entry and the aircraft apprentice scheme generally can be obtained if early application is made to the Royal Air Force, Gwydyr House, Whitehall, London, S.W.1. In this connection the sons of officers, warrant officers and senior N.C.O.'s of the three services receive special consideration.

The scheme offers a good opportunity to well-educated boys of obtaining a three years' apprentice course of a high standard and of following an interesting technical career. Already over 5,000 aircraft apprentices have completed their training at the technical schools of the Air Force, and the annual output is approximately 1,000 fully-trained aircraftmen.

The principal trades open to boys are metal rigger, a new trade brought into existence by the introduction of the metal aeroplane, which involves training in both fitting and sheet metal work, fitter (aero engine), fitter (driver, petrol), fitter (armourer), coppersmith and metal worker, wireless operator-mechanic and electrician. The apprentices are given a thorough training in their trade by highly-qualified technical instructors and their general education is also carried on simultaneously by a staff of graduate teachers.

During the training period the rate of pay is 1s. a day for the first two years and 1s. 6d. a day thereafter until the apprentice has both attained the age of 18 and been posted to a unit on completing his training. When he is posted to a unit for duty as an aircraftman, the commencing rate of pay varies from 3s. 3d. to 5s. 6d. a day (22s. 9d. to 38s. 6d. a week), according to the marks obtained in the passing-out examination. He also receives free board and lodging. A few apprentices of special promise proceed to the Royal Air Force College for training with a view to becoming Commissioned Officers.

For the remainder, opportunities arise later to volunteer to qualify in flying and become airman pilots. Selection to the number of over 700 is made annually from volunteers of all trades. From amongst airman pilots a few are periodically selected for commissioned rank.

VACANCIES FOR STORES OFFICERS—ROYAL AIR FORCE

The Air Ministry announces that about 8 vacancies for permanent commissions in the Stores Branch of the Royal Air Force will be offered for competition among young men of between 23 and 25 years of age on January 1, 1929, who have had not less than five years' business experience in a firm of standing. This will be the fourth competition under the scheme inaugurated in 1926 for the purpose of obtaining men with a business training to control and administer the supply of the highly valuable and complex equipment of the Royal Air Force.

From among those who apply a limited number of candidates will be selected to proceed to the examination, which will be held in London in the latter part of October, 1929, and will consist of two parts, an interview before a board and a written examination. The written examination will be of such a character that men of good general education can take it without special study.

Accepted candidates will be gazetted to commissions as Pilot Officers on probation and will receive six months' training in their future duties. After a year's satisfactory service they will be eligible for confirmation in their appointments and for promotion to the rank of Flying Officer. Promotion above the rank of Flying Officer will be by selection, subject to passing a qualifying examination.

The emoluments of Officers in the Stores Branch, including the value of quarters, rations, and services in kind, or cash allowances in lieu, range from approximately £364 a year for a Pilot Officer, and £400 a year for a Flying Officer on promotion, to £1,135 a year for a Group Captain (the highest rank for which provision is made). The expenses in Royal Air Force messes are strictly regulated so that Officers even of the most junior rank can live upon their pay.

Application should be made to the Secretary, Air Ministry (S.7), Kingsway, London, W.C.2, for the regulations and for application forms. Completed application forms should reach the Air Ministry by the 15th August next, or at the latest by the 1st September.

AIR MINISTRY NOTICE TO AIRMEN

Night Flying Without Navigation Lights

1. ROYAL Air Force aircraft will be flying over the areas defined below during the periods and at the times specified.

At the heights indicated, the aircraft will not exhibit navigation lights but arrangements have been made whereby these R.A.F. aircraft will not fly without navigation lights below 4,000 ft., when commercial aircraft operating on the continental air routes are in the prescribed areas.

The Royal Air Force aircraft engaged on these operations will switch on their lights if they see other aircraft in their immediate vicinity, but all civil pilots should nevertheless keep a special look out while flying over these areas.

(1) An area bounded by lines joining Chessington, Addington, Holmwood, Cowden and Chessington. Above 2,000 ft. July 1 to August 11 inclusive, Sunset to Sunrise.

(2) Between Lingfield and Banstead. At 1,000 ft. July 10, 17, 24, 31, August 7. 2100—0100 B.S.T.

2. Further to Notice to Airmen No. 31 of 1929, flying without navigation lights over area (i) detailed therein, will also take place during the period September 2 to 27, 1929.

(No. 35 of 1929.)

KING'S CUP SUCCESSES

Armstrong Siddeley Records

By winning the 1929 King's Cup Race for the circuit of Britain, and making fastest time of the day at 150·3 m.p.h., the Armstrong Siddeley "Jaguar" engine completed a remarkable record of endurance and speed. In the 1923, 1924, 1925, and 1926 King's Cup Race, an Armstrong Siddeley engine made the fastest time of the day, winning the event on the first three occasions, while on the fourth, when piloted by Sqdn.-Leader H. W. G. Jones, it put up the record speed of 151·9 m.p.h., although beaten on handicap. In 1923, Capt. Courtney won on a "Jaguar"-engined "Siskin" at 149 m.p.h. In 1924, the winner was A. J. (now Sir Alan) Cobham on a D.H. 50, with Armstrong Siddeley "Puma" engine at 106 m.p.h., while in 1925, the late Capt. F. L. Barnard, flying Sir Eric Geddes' "Jaguar"-engined "Siskin," won at 141 m.p.h. Thus, on all these five occasions, an Armstrong Siddeley engine has either won the King's Cup, or made the fastest time of the day.

Titanine Dope

THE 22 machines which finished in the King's Cup Race were doped throughout with Titanine.

K.L.G. Plugs

THE same success must be recorded for K.L.G. plugs. They helped every finishing machine round the 1,169 miles' course in hard weather conditions. That triumph, incidentally, was a repetition of last year's success, whilst we are also reminded that every King's Cup winner has used K.L.G.

B.T.H. Magnetos

THE 22 machines which completed the entire course for the King's Cup Race this year were fitted with B.T.H. magnetos.

* * * *

Light 'Plane Agency Wanted

ROSS, DYSART AND MCLEAN, motor engineers, etc., 200, Karamu Road, Hastings, New Zealand, inform us that they wish to obtain an agency for a light aeroplane, and they would like to hear from manufacturers on this question. In particular they refer to a 'plane cheaper than the "Avian" and "Moth."

Mr., Mrs. or Miss ?

APRIL Day is quite all right when it comes once a year, but it is evidently not quite so right when associated with the organisation of a Ball. *Then* one has to watch one's steps in case one is made to appear a fool by April in June. Thus, it seems the Civil Aviation Ball, which is to function in connection with the Air League, has led FLIGHT very near unto that position—for, having received a request from non-prefix "April Day" as part organiser of the said Ball, we poor fish, in our sublime and unwarrantable ignorance of the said April Day, went wrong in assuming that it was of the he gender. For this we are sorry, and upon it being pointed out that April Day was "a member of the feminine clan," who doesn't like being called "Mr.," a sub-editor, without reference to the compiler of the original paragraph, apologised—as was only courteous—ascribing the slip to a typist's error—which it wasn't—and then proceeded to set matters right by barging *his* foot into it a bit deeper in describing (with apologies) April Day as "Mrs."! This was the final straw, as April Day at once retaliates with "Why should I be married if I do not wish to be married, or do you think I have not reached the age of discretion enough to run a Ball unless you address me as 'Mrs.'? I once was 'Mrs.' but now I have thankfully reverted back to 'Miss,' although in this age of three million surplus women, I suppose I should have hung like grim death on to the 'Mrs.'"

So there, "that is what she wrote." Please be it known, one and all, that it is given under her own hand as *Miss* April Day. We would, however, humbly suggest in these days of universal suffrage, when practically in all documents with names it is set out "Mr., Miss or Mrs.", that this form might be a good example to follow in sending out printed letter paper with no distinguishing pre-fix to guide those who may sin in ignorance by reason of their not moving in the privileged society of the writer—leaving one guessing in like manner to the curious public who, in the Wilkie Collins days of long ago, were so mystified for weeks by the simple preliminary announcement on all the hoardings of "Miss or Mrs.?"

Anyway, we wish all the good work being put in by Miss April Day and her colleagues for a day in July—to wit, Friday, July 19—on behalf of the Air League of the British Empire Aviation Ball at Grosvenor House, Park Lane, may result in a magnificent attendance. For tickets at 30*s.* each (which includes supper), we would remind our readers, application should be made to *Miss* April Day, at 14, Clifford Street, Bond Street, W.1.

PUBLICATIONS RECEIVED

Aeronautical Research Committee Reports and Memoranda: *No.* 1168 (*Ae.* 332).—Experiments on a Model of the Airship R. 101. By R. Jones and A. H. Bell. Sept., 1926. Price 1*s.* 3*d.* net. *No.* 1196 (*Ae.* 357).—Report on Progress During 1927-28 in Calculation of Flow of Compressible Fluid, and Suggestions for Further Works. By Prof. G. I. Taylor, F.R.S. Sept., 1928. Price 1*s.* net. H.M. Stationery Office, Kingsway, London, W.C.2.

Die Grundlagen der Tragflugel- und Luftschraubentheorie. By H. Glauert, M.A., and Dipl. Ing. H. Holl. Julius Springer, Linkstre, 23-24, Berlin, W.9. Price Rm. 12·75.

Year Book of the Aero Club of South Africa, 1928-9. The Aero Club of South Africa, P.O. Box 6033, Johannesburg, S. Africa.

Eléments Créateurs du Droit Aérien. By A. Henry Coüannier. *January, February, March*, 1929. Per Orbem, 4, rue Tronchet, Paris. Price 35 fr.

League of Nations Armaments Year-Book. Fifth Year. 1928–1929. League of Nations, Geneva.

Simple Aerodynamics and the Airplane. By Charles N. Monteith. The Ronald Press Co., 15, East 26th Street, New York, U.S.A. Price 4.50 dols.

Airplane Structures. By A. S. Niles and J. S. Newell. New York: John Wiley and Sons, Inc. Chapman and Hall, 11, Henrietta Street, Covent Garden, London, W.C.2. Price 25*s.* net.

New and Used Cars.—Auto Auctions, Ltd., Burlington Gardens, Old Bond Street, London, W.1.

* * * *

NEW COMPANIES REGISTERED

ALLISTON AVIATION CO., LTD., 139, High Road, East Finchley, N.2.—Capital £100, in £1 shares. Aircraft dealers, constructors and hirers, carriers of passengers and goods, etc. First directors: W. Alliston, 13, Buckingham Avenue, Whetstone, N.20; A. Alliston, 139, High Road, East Finchley, N.2.

AEROTANK SYNDICATE, LTD., 65/70, Cannon St. House, 110, Cannon Street, E.C.—Capital, £1,000, in 1s. shares. Acquiring options to purchase patent rights for Great Britain, its Dominions, Colonies and Dependencies, and/or the U.S.A. numbered 189100, 240747, 279291, 289659 and 294424, or any of them relating to fuel and other tanks, pipes and the like, their linings or coverings and to adopt an agreement with P. Poberejsky. Secretary: W. J. Kimmins. Solicitors: Ernest Salaman and Co., 62, London Wall, E.C.2.

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AERONAUTICAL PATENT SPECIFICATIONS

(*Abbreviations*: Cyl. = cylinder; i.c. = internal combustion; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

APPLIED FOR IN 1927

Published July 11, 1929

32,973. N. MACMILLAN. Tail surfaces of aircraft. (313,415.)
33,478. C. R. J. RANDALL. Means for trimming of aircraft in flight. (313,416.)

APPLIED FOR IN 1928

Published July 11, 1929

734. G. E. T. EYSTON. Control of supercharges for i.c. engines. (313,417.)
3,291. A. P. THURSTON. Aircraft. (313,419.)
11,005. SOC. GENERALE D'ETUDES INDUSTRIELLES. Cylinders of air-cooled two-stroke-cycle i.c. engines. (288,643.)
11,535. D. DEVINE. Screw propellers. (313,694.)
12,260. E. DAVIS. Aeroplanes having pivotally-mounted supporting planes. (313,704.)
12,860. J. S. DREWRY and SHELVOKE AND DREWRY, LTD. Means for lifting and towing aircraft. (313,714.)
20,376. P. COLAVITO. Seaplanes. (293,840.)

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